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Factors Affecting Alberta CTS Automotive Programs' Growth and Decline

by

©

Vincent Cullen

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Education

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Factors Affecting Alberta CTS Automotive Programs' Growth and Decline* submitted by Vincent Cullen in partial fulfillment of the requirements for the degree of Doctor of Education.

I respectfully dedicate this dissertation to the following:

Wendy Loyk, for her support over the years of my doctoral study;

My family and my friends who have supported my efforts during my studies;

My grandparents, who have consistently been a source of encouragement by the example that they set for me in creating life's rewarding opportunities and persevering when those opportunities seem unattainable;

Also to my faithful friends Flip and Jet, who added comfort and quality to the many hours I spent at my desk as they lay nearby and for their timely enthusiasm to play Frisbee in the park when I needed a break from my studies.

Abstract

This dissertation explores and clarifies the past, present, and future aspects of factors that contribute to the growth and decline of Alberta's high schools in the subject area of career and technology studies, mechanics, specifically, automotive mechanics. One purpose for this study in career and technology studies is to suggest possible new directions and understanding for practitioners of automotive programs to deal with this newly implemented Alberta curriculum. The instruments used in this study were a teacher perception survey and an individual school observational survey completed by the researcher. Both qualitative and quantitative approaches to research have been used in the data collection, as well as postmodern and deconstruction theories to assist with interpreting and explaining the data. This study is intended to assist those CTS automotive program stakeholders who might be asking questions about how and why the change to the new CTS curriculum has affected the province's automotive programs. It is also intended that this dissertation offer possible insights for future directions and add to the understanding of how continuity of the junior high industrial arts, senior high automotive, and college/institute automotive programs may be improved.

Acknowledgements

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Apprenticeship Board

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CHAPTER I

INTRODUCTION

General Statement of the Problem

The purpose of my research is to examine and report on the past and present situation of the Career and Technology Studies (CTS) automotive programs in the province of Alberta. Additionally, this study identifies factors that influence the growth of some programs and the demise of others. Many of the programs that continue to function are at a stage where individual schools and/or districts require knowledge of these factors to help them decide whether their automotives program in their school has a future. Concerns created by an aging teacher population, equipment-procurement strategies, industry's demand for automotive skilled apprentices and the need for teachers to update their skills and education are other reasons why such a study may be of use. Further research could explore these factors individually and in greater depth.

A study of Alberta's automotive programs is required because many of them appear to be faltering and not meeting the needs of students and possible career paths. Automotive programs have great potential, because students view the subject as the most popular CTS strand in those schools that offer it, based on a pilot study. Students and parents see the relevance of acquiring automotive knowledge and repair skills since most students are beginning to drive at this time of their life and will own on an average of 11 vehicles in their life time. The potential of the programs to be successful is also found in that the present industry demands are that many of the Alberta communities are in need of apprentices. However, at this time it appears that few schools in Alberta have successful CTS automotive programs, based on semi-formal interviews with teachers and the pilot-research study. One of the main problems may be that school administrators and teachers are unclear as to how to deliver the new CTS courses successfully. Some programs have dwindled so that they offer only a few modules, while others have closed

altogether. Still others have grown and seem to anticipate a continued positive future for CTS automotives. There are also the advantages and disadvantages of the newly introduced curriculum of 1997 that are beginning to affect programs. Herein lie the theories and rationale for the study of the factors that can contribute to growth or decline in automotive programs in the province of Alberta.

My primary research question was:

- What are the factors affecting growth and decline of CTS automotive programs in Alberta?

My secondary research questions were:

- How should individual schools determine student-teacher ratios for their particular shop so to ensure a safe and effective learning environment?
- Is it essential to have a journeyperson/teacher for a successful program?
- How many extra students may be placed in a class when a licensed journeyperson aide assists a journeyperson teacher?
- What are the successful feeder-school promotion strategies to inform the junior high school students and staffs of the automotive programs?
- What are the current extracurricular programs offered at schools with successful automotive programs that lead to further development and growth of CTS automotives programs?
- What are the safety issues concerning CTS automotives facilities in Alberta's schools?

The CTS Curriculum

The new CTS curriculum has over 22 strands of which automotives is one. The old curriculum saw each trade as a distinct subject. The new 1997 CTS mechanics curriculum replaces the latest 1984 revision of the old "Automotive Industrial Education Program" curriculum. For continuity, the term "mechanics" will be replaced throughout

the study by the term "automotive". The old curriculum had been in place with several revisions since the 1950s. The old curriculum was based on the college-post secondary model. The college's curriculum was formulated by following the required skills suggested by local and provincial industry advisory committees. The new curriculum was intended to modernize the theme-concepts taught as the automobile had advanced technologically, from the beginning of the twentieth century.

Each strand of CTS has been divided into modules/courses that have broad learner expectations. This new modular approach was to better allow schools to offer the modules that best represent their facility, equipment and tools and the teacher's areas of expertise. As in industry the mechanic usually has an area specialization. It was also intended for the teacher to facilitate rather than teach as each student could be working on a different module/course at any one given time and could be progressing through the modules/courses at different rates. The old curriculum had a traditional delivery format of having all of the students learning the same theme-concepts simultaneously with the teacher delivering and didactically guiding the learner through the proposed course curriculum guide ending with a final exam in the last few days of the semester or the school year.

Significance of the Study

This study examines and addresses the phenomenon of declining programs and identifies the factors that have led to some programs flourishing. Of a secondary significance is the interest shown by the various stakeholders who are involved with automotive programs in high schools in Alberta.

Stakeholders

Below is a list of stakeholders involved in a brief pilot study to determine the viability and significance of a study such as this:

- the students of the programs in Grades 10, 11, and 12;
- the parents of the students;
- the automotive teacher;
- the school administration;
- the school board;
- Alberta Learning;
- the colleges of Alberta , including NAIT and SAIT;
- the Apprenticeship Board; and
- the Workers' Compensation Board.

The views of the following stakeholders of CTS automotives programs and their recommendations for the programs will be discussed.

The Student

From the findings of the pilot study, approximately 150 students at three levels—Grades 10, 11, and 12—considered their idea of success in automotives as organized, structured, and meaningful work. They wanted to know their progress in the program, with a clear explanation of what was expected of them in order to fulfil the various credit requirements in any of the three grade levels. Students said that the program was easy and that they wanted to do more complex work such as rebuilds; they were not as interested in diagnosing trouble conditions. Students as stakeholders agreed that teachers should be accountable at any point of the program for their students' work, module progress, and evaluation. Students indicated that currently, this rarely happens. Usually students conveyed that they had either not taken the complete module, or not done the module at all, yet it appears with a grade on their transcripts. Most Grade 12 students indicated that changing oil and washing vehicles were the limit of their practical experience. This suggests further that the practical requirements of each module is the hardest learning environment to create for the student, as some students remarked on

being taught only the theory segment of each module and only segments of the practical requirements.

I asked the students, *"If Mom asks you what you have done or learned in your two to three years of automotives, what would be your honest reply?"* Most responses suggested frustration because of doing nothing more than car washes and oil-change services. A positive reply was that at any time they could bring in their cars and do whatever repairs or cleaning they wished. Normally, this entailed simple repairs which were carried out infrequently. Most students stated that they did not understand how they could receive credits for modules when they had not taken the theory and/or done shop work in that particular module. When asked about safety, they indicated that safety instruction and enforcement were lax but that they were not concerned personally because injuries had been minor and few or nonexistent.

The Parents

Parents wanted the schools to be accountable for their child's learning and to have a better curriculum than they had had when they went to school. Parents wanted reassurance that if their child passed a CTS course/module, he or she had indeed fulfilled the theory and practical requirements of the subject area. However, they seemed to be content with the fact that if credits had been given, then the child must have learned the concepts and curriculum and completed the specific CTS modules.

Parents seem to have placed a great deal of trust in the school. They believed that the school provided the learning experience and was responsible for program delivery. The parents further stated that they would like to know if their children's school was assessed on its performance. They admitted that they knew little of what took place at the school, and they wanted to be sure that the school was actually delivering instruction according to the curriculum.

The Automotive Teacher

The automotive teachers indicated that meaningful work is usually intrinsically gratifying to most teachers. Stress and anxiety are inevitable when a teacher feels that program requirements are not being fulfilled. Teachers also indicated that they felt concern about the program and their responsibility; for example, evaluation of student outcomes: Would the teacher's performance be evaluated relative to poor student achievement? This concern arises again and again as students consistently pass courses and receive credit for theory and practical work which the teacher and the students know has not been covered.

A few CTS automotive educators commented that the teacher would express positive feelings if they were experiencing success and that it would be evident to all stakeholders if they were to visit or evaluated a school's automotive program. These same teachers openly offered to assist other teachers at neighboring schools with their programs. Why help a competing school? Good teachers in any subject area are concerned with instilling knowledge and assisting students, and they are usually willing to share their knowledge with other teachers. Some of the automotive teachers asked to be provided with information on certain aspects or the entire study once it was completed, since they believe the findings might assist them in ensuring that their programs are effective. I agreed willingly to provide them with this information.

The School Administration

Most administrators wanted to ensure that an economically and logistically feasible program was being offered in the CTS automotive area. Like the other stakeholders, the administration wanted a CTS automotive program that was well organized and complete in all aspects. Administrators stated that characteristics of successful automotive programs included full classes, fewer student behavior problems, increased enrollment, peer referral, and promotion. The administration's goals are to

provide the teacher with the resources to organize a sound program. Many of the schools' administrators stated that they would continue to try to do all that they could to ensure the success of the automotive program; for example, advertising courses offered, timetabling, procuring shop tools, etc., as long as requests stayed within the budget. The administrators stated that they rely on the automotive teacher for advice concerning the shop area and program, because few administrators have any trade or vocational experience.

School Boards

Most school boards are concerned that some CTS automotive programs continue to have declining enrollments or are phased out altogether, while others grow or continue at full capacity to produce fully qualified students who meet Alberta Learning's mandate. The boards stated that they were in the "people" business and wanted every school to meet the expectations of their stakeholders. School boards recognized that successful programs involve many variables. Edmonton Public and Separate and Calgary Public and Separate Schools are currently in discussions with Alberta Learning, the University of Alberta, the University of Calgary, NAIT, and SAIT on the evolution of the old curriculum in automotives to the new CTS course/modules. Calgary Separate Schools and SAIT were the first to begin evening and weekend training for the Journeyperson teacher to become more knowledgeable about the new technology found on the recent vehicles.

Alberta Learning

Alberta Learning indicated frustration with the fact that the new CTS course curriculum was designed by nonautomotive teachers and has recognized that few automotive teachers follow the new CTS automotives curriculum. Alberta Learning's CTS coordinators stated they were busy with all of the other strands including automotives and therefore were unable to take the time to identify changes to remedy the

automotive program concerns. Schools that fail to be accountable will likely not be funded for those course modules that are not properly documented and delivered to the students; however, few audits have taken place. Alberta Learning personnel stated that a student's cumulative file be an accurate representation of his or her knowledge based on the specific outcomes that are written for each module. Alberta Learning, teachers, CTS coordinator and other informed stakeholders such as parts supply companies, equipment manufactures stated that the new curriculum requires adjustment or further revision and some further stated that proper accounting of the student's completed modules rarely take place. However, they assume that the schools deliver the complete modules. Only one school has reported that it had been audited.

Alberta Colleges, Including NAIT and SAIT

NAIT and SAIT personnel felt that the K to 12 school system should not be involved in teaching the CTS trade areas. They felt that the core courses should be the focus and that if a student wants to become a technician or an apprentice mechanic, he or she should attend NAIT or SAIT after completing Grade 12. The Alberta colleges have begun to consider the value of the high school programs as a positive way to inspire students to continue to post secondary automotive training. This recent shift has taken place since there seems to be a correlation in geographic areas between the number of apprentices and high schools students that have taken some high school automotive courses.

Most schools believe that automotive education at the high school level is based on learning to repair automobiles for personal gratification and that hands-on training (manual dexterity skills) complements a successful, well-rounded high school education. Whereas, NAIT's, SAIT's, and the other college programs are based on industry standards, which are required for automotive dealerships and private automotive repair shops, wrecking yards, and so on, for technicians or journeyperson licensed mechanics

who work on vehicles to earn a living. Both the colleges and high schools agree that a high level of training must take place to diagnose and repair today's automobiles.

Alberta Learning and the colleges agree that advanced-standing articulation for high school automotive students who wish to continue their studies in automotives as a career is a positive step in encouraging more students to become apprentices. Some successful high school CTS automotive programs have chosen distinct course modules that meet all the prerequisites of the articulation program. This advanced standing in the articulation programs allows a 30-level student to challenge the first-year apprenticeship program examination at the college level.

The Apprenticeship Board

The Apprenticeship Board values quality high school automotive training. Currently, there is a shortage of licensed journeypersons in Alberta in many trades, including the Motor Mechanics (The Apprenticeship name of the designated trade of Automotive Mechanics). This situation is likely to continue in the near future. This is evidence, therefore, of potential for graduates of a high school automotives program to enter the automotive trade. The Apprenticeship Board has also recognized that many people in other trades develop interest and begin their skills acquisition in programs offered in Grades 7 to 12. The agreement between Alberta Learning and the Apprenticeship Board in creating an advanced-standing articulation program is a direct result of Alberta's anticipated demands for skilled trades people. The Apprenticeship Board has stated that an urgency exists for appropriately trained automotive students because the average apprenticeship program requires 4 to 5 years of indentured work with an employer. In light of these findings, action should be taken to contend with current and future shortages.

Workers' Compensation Board (WCB)

Not all high school automotive students will become journeyperson automotive mechanics, yet it is evident that many of our high school students with trades education will enter trades and newer technology related businesses where WCB regulations apply. High school automotive programs are by far the province's most popular courses in those schools that offer trades related courses. Although the WCB is not required to regulate education institutions, much of the curriculum on shop safety and procedures is first presented to the future work force in school CTS programs. Because good habits are seldom recognized and bad ones are hard to eradicate, the WCB takes an interest in supplying schools with educational materials and presentations related to shop and workplace safety.

If an injury occurs in a school, is there reason to believe that it is just "an accident"? Could it be that our students experience a lower standard in safety than they would expect to see on an Alberta job site? The WCB stated that the schools have become more lax over the years regarding safety rules and equipment, but the board did not know who is responsible for safety issues that teachers may have about their automotive programs.

Research Hypotheses, Questions, Objectives, and Purposes

Based on the preliminary information gathered and from the underlining themes in the literature, the following research hypotheses have been identified:

- A positive relationship exists between successful automotive programs and the number of students completing the articulation program of studies, which allows students to gain advanced standing in the apprenticeship program.
- A positive relationship exists between successful automotive programs and qualified journeyperson teachers.

- Teachers have a perception that the new CTS curriculum is not as efficient and well suited to the automotive program of studies as were the previous curriculum automotives courses 12, 22ABC, 32ABC (1984 Curriculum Guide, Automotive Industrial Education Program).
- A positive relationship exists between successful automotive programs and an optimum student-teacher ratio of a given program.
- A positive relationship exists between successful automotive programs and the related number of extracurricular items offered by that program.
- There will be a difference between the success of programs with a customer-service aspect and those that use shop vehicles instead.
- There will be a teacher-perception difference between school-budget-supported programs and those programs generating income through customer service.
- There will be a difference in teacher perception/program success between programs in which teaching two or more modules simultaneously is mandated and those which have the teacher deliver one module to the entire class at once.

CHAPTER II

LITERATURE REVIEW

Vocational Education Before the Automobile

This literature review summarizes the history of the automobile's evolution, aspects of the automotive mechanic and the educational changes that have influenced the development of Alberta's high school mechanics curriculum. There are no known research studies that have looked directly at automotive programs in Alberta high schools. This may be surprising due to the popularity of such courses, the fact that the automotive industry is one of the world's largest industries and that most people in North America own cars. Typically, today's automobile industry greatly affects most country's Gross National Product. The arrival of the automobile has played a part in the history of Canada, supplementing the railroads in the transportation of goods and people but also allowing settlers to travel to areas in which railway track had not been laid. Train transportation was simply mass transportation, and the arrival of the automobile greatly influenced the freedom of the individual to be able to travel greater distances at his or her convenience. Individual transportation before the automobile was primarily by horse, which allowed travel of approximately eight miles a day. Hence towns along roads and railway lines were placed at that distance (Buck, 1997).

Automobiles were invented in the late 1800s and an apprenticeship model of trades preparation was accepted, since the automobile represented the merging of several older apprenticeship model trades. The history of training tradespersons to acquire the skills that influenced the creation and development of the automobile will be discussed. The Medieval Trade Guild of the 11th and 12th centuries in Britain determined and controlled the craftsmen's skills. The guilds also attempted to control the trade, and to protect the employment of the individual's in the guilds. The guilds became organized politically and recognized that standards of craftsmanship were needed to determine the

capabilities and limitations of the craftsperson's skills. It was these guilds that established that the master craftsperson (MCP) should educate the apprenticeship craftsperson (CP). The general understanding was that by providing its work force with a broader education, CPs would learn the specifics of the trade, understand the general ways of the world and, in turn, the power struggles of the guilds and how the guilds could continue to ensure a respected place in society.

As the European economy moved from productivity within individual houses to the first factories, the guilds evolved to accommodate this shift. The CP became more of an employee of the factory and less of an independent contractor hired by the factory owners, thus controlling the numbers of CPs hired for these first factories. The factory owners recognized that if they were to pay the MCP to educate the CPs, the factory would have its own self-serving training program. This would prove significant in guaranteeing a continuous stream of skilled workers for the factories. The apprenticeship system was now becoming formalized in a different way than previously, with industry taking some of the role away from the MCP. The apprentice would then become indentured to the employer. This led to two interesting outcomes: (a) The apprentice ceased to be an independent and became an indentured employee of the factory, and (b) the apprentice, by becoming indentured, gained for the first time an understanding that there was an expectation of long-duration employment. That was better than sporadic work with different projects, usually involving travel; hence the name "journeyperson." These new factories were stationary, and the apprentice quickly recognized the importance of job stability and not having to be away from family members and the farm.

Along with the factories came a change in the titles of the workers, who were generally now hired for *positions*. The master craftsperson (MCP) became a master tradesperson (MTP), and the apprenticeship craftsperson (CP) became a tradesperson (TP). It was during this period that the TP and MTP realized that their employer would have an influence on which TPs become MTPs. Previously, virtually all TPs had become

MTPs. Factory managers were now choosing fewer MTPs and a greater number of TPs, and advancement for TPs was becoming limited. For the first time MTPs became full-time trainers and did not always work on the factory floor. They recognized the problem that as the factory retooled for a different job, the full-time training MTP did not know the required new skills. Therefore, factory managers began to rotate MTPs onto the production floor for short periods to allow them to learn the new skills, which they would then pass on to the apprentices.

In 1642 the Society of Jesus (Jesuits) brought the apprenticeship programs to the colonies of North America (Meyer, 1965, p. 171). The Jesuits had by this time refined the teaching of practical arts programs in France and had opened two schools in Canada in 1668 (p. 19). By the middle of the 17^{th} century, Canada's educational system was based on the British system and on the Church of England. Other religious groups such as the Methodists also provided education.

This European industrial model of production expanded to other countries, and Canada became more influenced by the apprenticeship training system in the late 1700s and the early 1800s. As Canada expanded westward in the 1800s, skilled TPs were required for work on the railroad, in small factories, and in the building trades. Skilled apprentices were needed in shipbuilding and construction and in areas more closely related to the automobile, such as a variety of manufacturing plants, bicycle factories, and the large railroad production factories. TPs were required in such areas as carpentry, roofing, masonry, shoemaking, tailoring, and metalworks. By the late 1800s, trade schools were becoming more efficient in the methods of training the apprentice, and the educational methodology of rote learning, following the traditional British didactic method in a regular classroom setting, was used for the theoretical aspects of training. Manual dexterity skills were the main focus of the apprenticeship and were taught by the MTP, who by this time had become a trainer of more than one apprentice at a time. This was a departure from the older one-to-one training formalized in medieval times.

In 1885 what could be called Canada's first vocational training program was begun at McGill University in the area of the applied sciences (Meyer, 1965, p. 207). In 1896 Ontario led the way with legislation allowing high schools to teach technical education (p. 208). As in Europe, the shift from agriculture to an industrial-based economy required a differently skilled work force. Ontario schools became the example for the West shortly thereafter. By 1900 the automobile was introduced in Canada, along with the motorcycle; however, these were few, and confined to areas with all weather roads. At this time there were a few motorized pedal bicycles. Individual mechanized transportation, however, was affordable only to the wealthy and only in larger urban areas where these vehicles were sold and where there were suitable roads. With the exception of mechanized streetcars, it would be years after the invention of mechanized transportation before Alberta would have a significant number of these transportation machines. With the arrival of the automobile, there was an almost immediate need for skilled automotive mechanics, metalworkers and machinists, because the vehicles were not reliable, required skilled maintenance, and because the roads of Alberta were rough and not paved. To meet the needs of skilled tradespeople, there was a need for vocational programs to educate apprentices in these new areas.

Larger factories had an organized structure for skilled MTPs and apprentices such as the Canadian Pacific Railway's Angus shops located in the city of Montreal. The MTPs, also recognized as foremen, were the last link to management who still possessed current tradesmen's skills. Some of the foremen were known as working foremen because they had a dual role of working in the factory with the apprentices. These MTPs/foremen also became the link to the factory owner/managers. At this time many of the larger factory owners and managers did not possess the necessary manual dexterity skills to work on the production floors of factories; however, most were still knowledgeable about the majority of the processes.

The land area now called Alberta was at that time called the North West Territories. (NWT) Prior to the settlement by Europeans in the early 1900s the aboriginal population was largely nomadic, The immigrant population were largely agrarian, and were separated widely, usually along railway lines. The industrial world was also rapidly expanding. The late 1800s would prove to be the beginning of the horseless carriage era in eastern Canada and would see the future industrialization and prosperity of the NWT region follow those of the eastern provinces.

Vocational Education After the Automobile

In Alberta's history it was to be a long time after the invention of the automobile, motorcycle, and motorized bicycles that families and individuals owned and used them and much longer before vocational education in automotive mechanics was introduced in Alberta, and particularly in Alberta's high schools.

In the early 1890s the Alberta education system recognized the changes in education that had taken place in Ontario (Northwest Territories Department of Education, 1903). In 1902 the Calgary School Board passed the following resolution, which was a testimony of the experiment's success:

> Resolved that after almost two years' attendance of our pupils at manual training classes, which has fully confirmed our opinion of the very great benefit to be derived from such training, we strongly recommend that the subject (provisional course) be placed on the school program of studies and that the curriculum be so modified as to allow time for the teaching of it. (p. 52)

Almost immediately, educators and stakeholders recognized the relevance of manual training to the learner. The students used their acquired skills in manual training to do farm maintenance and related chores when they returned home after school, greatly benefiting the typical farmer of Alberta.

A federal Royal Commission can make recommendations on educational matters to various provincial departments. A Royal Commission in 1907 introduced the next significant program that affected Alberta high school curricula. The province of Alberta

was accepting of what financial support it could get for the increasingly popular industrial training and technical education. A three-year federal study by Dr. James Robertson during this same period on industrial training and technical education concluded that financial support for the programs should be provided by individuals, local authorities, provincial governments, and the dominion government. The report recommended that $350,000 be divided among the provinces to help to prepare people for industrial, agricultural, and housekeeping occupations. A chief educational officer of the province would apply to Ottawa for a portion of the funds based on a yearly provincial report (Munroe, 1974, p. 7).

The findings of the 1907 Royal Commission and the established Ontario models helped shape the development of technical education in the province of Alberta. Because Alberta was short of industrial tradespersons, and agrarian skills were becoming necessary on the many farms in Alberta, the Agricultural Acts of 1912 and 1913 made money available for agricultural and related training. The Agricultural Instruction Act of 1913 made $1,000,000 available to the province each year over the 10 years of the Acts (Munroe, 1974, p. 7). Automobiles were only beginning to arrive on the few roads of Alberta, and tractors had already proven to be a worthwhile replacement of the work animals on farms. The industrial competence of the new province seemed to be based on demand from the increasing technical requirements of the farms and the new factories that were built to manufacture goods. This was also the period of World War I, and a technically skilled work force was necessary to supply a successful war effort. This was the underlying theory of the war effort. The reality was that Canada's technical supply to this world war was small, but our troops assisted the allies over seas.

The Technical Education Act of 1919 helped to provide major financing to the province for the following 10 years. Census information was used to assist in dividing up funds for each province (Statutes of Canada, 1919, Chapter 73, pp. 665-666). The accountability for these funds included quarterly reports, attendance statements of

teachers and students, and specifications of the new buildings or renovations information relating to the existing buildings. During this period national enrollments in vocational education courses increased from 60,456 to 121,252 students. Alberta received $656,740, which significantly helped to finance the programs (Young & Machinski, 1972, p. 7). Alberta was able to follow the example of Ontario's vocational evolution. Ontario received five times the funding that Alberta received due to the parameters laid out in the Act. The Alberta government now had a clear vision and an example of how to apply for and receive huge amounts of grant money for the much-needed and popular programs. The federal government's goal was to assist in developing a pool of skilled manpower to meet the needs of the growing Canadian industry. The federal government acknowledged that adequate training programs and facilities were extremely expensive for local and provincial authorities. Even though the federal government would contribute 50% of the funding, Alberta was one of the provinces that occasionally struggled to finance expenditures on technical education. For example, the Vocational Education Act of 1931 provided funds based on census population figures over the next 15 years

The automobile was dramatically increasing in numbers in Alberta during the period immediately after the first world war, following the trend set earlier in the province of Ontario. Automobile manufacturers were now beginning to set up dealerships, and car owners required skilled mechanics to keep their vehicles running. Alberta's roads were being built and upgraded to accommodate the increase in passenger and commercial vehicle use and to be as vehicle friendly as possible. Growth of automobile use in Alberta slowed due to the onset of the Depression. Although, automotive vocational training programs were under way in Ontario and in Alberta, by 1914, the years during the Great Depression of 1931 to 1938 drastically affected the Canadian economy, and funds for technical and vocational training dwindled. The exception were the monies based on the census population figures of the Vocational Education Act, that contributed half of the small amounts of funding contributed by the

province. With many unemployed skilled workers and an unprecedented increase in unemployed youth, it was understood that a federal program for technical and vocational training was required. Funds began to be directed into youth training/work schemes in various types of projects in aviation, mining, forestry, agriculture, and park beautification.

In 1939 the Youth Training Act allotment increased to $1,500,000 per year. This Act provided for the addition of trades training in welding, woodworking, radio, machine operations, sheet metal, and motor mechanics, which primarily involved automobile engines and drive trains of passenger vehicles (Chalmers, 1967, p. 210).

World War II created a huge demand for aviation mechanics, and because of the public's understanding of the urgency for a successful war effort, "crash-courses" for untrained personnel were established to fill the requirement. Motorized vehicles of various types played a major part in the war, and Alberta's automobile industry was one of the technical areas that increased during this period. The postwar reconstruction effort played an even larger part in the significance of the automobile and the development of programs for skilled tradesmen to learn to maintain them.

The federal Vocational School Automotive Agreement of 1945 allotted financial support to secondary school vocational programs. Now the high schools in Canada had a clear mandate and financing to offer vocational career education. The annual grants were plentiful, and the high schools, staff, and students welcomed the new and popular vocational education programs. The early 1950s was also a boom time for the automobile industry. Eastern Canada was experiencing major industrial growth, and the automobile was in demand by almost everyone. Roads across Canada were now being paved, and construction techniques had improved over those of previous years. This became another reason for Canadians to plan holidays involving driving. The automobile was becoming a cultural phenomenon, and Alberta high school students were able to learn the basics of

the mechanics of the automobile. This further accelerated the desire of students to own a vehicle and or become tradesmen in automotive mechanics.

In 1937 the Vocational Technical Training Agreement No. 2 replaced the existing Act. According to Grywawlski (1973), from 1946 to 1956 the supply of skilled workers in Canada increased by 280,000. Of this number, 40% were supplied by net immigration (p. 662). The 1950s pushed to meet the needs of industry by training Canadians rather than importing skilled labor from other countries. Federal manpower planners began to plan strategically to educate Canadians, with the idea of virtually eliminating the need for industry to seek skilled labor from outside Canada. The National Federal Model added continuity through junior high school, high school, and postsecondary education in the hopes of having more students develop the skills and eventually fill the country's requirements for skilled labor, while reducing the number of unproductive members of society. The huge numbers of unemployed people during the Great Depression was a constant reminder of a negative social climate that was to be avoided in the future.

The late 1950s saw the beginning of rising youth unemployment at a time when federal officials were eager to convey the notion of vocational education as a viable means of getting people trained to fill needed jobs and not having to rely on immigrant labor. The Leduc oil discovery also fueled demands for the automobile. The automobile industry was becoming one of North America's largest industries. American manufacturers were designing cars that were more than transportation; they were being designed for every type of automotive consumer: the vehicle for the housewife or the larger vehicle for the riding comfort of large families. The car was now more than a mode of transportation. Alberta was at a point where economic indicators were positive and societal changes indicated that vehicles and consumer products of the future would lead to an easier life with more recreational time.

In 1960 the National Employment Service (NES) revealed that of every 10 people on the unemployment roll, 9 had not completed high school. The report concluded that

job security was almost guaranteed in business or in industry if young people received a good education in school and in trades training (NES, 1960, p. 19). Michael Starr, Federal Minister of Labor, acknowledged that most high school graduates had inadequate preparation to enter the more technological world of work. Again the continuity of junior high, senior high, vocational, and postsecondary programs was in question because many young Canadian workers were at a disadvantage compared to readily available immigrant laborers.

The liberal political climate of the time insisted that young Canadians would be better off attending technical or other institutions rather than being idle (Government of Canada, 1960-61, pp. 584-585). The Technical and Vocational Training Assistance Act (TVTA) of 1960 provided funds so that all of Alberta’s vocational activities could be grouped together. The continuity between junior high, senior high, and postsecondary would be maintained through various different types of fundable programs consisting of high school vocational education programs for students and other pre-employment types of programs for the unemployed youth. They were also a part of the program for the technical training of vocational teachers. Bill C-49 was a part of this agreement and was the largest single focus of vocational training advancement in the country’s history.

By June of 1963 a total of 18 new vocational schools or wings were under way in Alberta (Cunningham & Chalmers, 1963, p. 1). The total injection of funds directly related to the TVTA Agreement was reported to be $75,292,221.67. Half of this was used in Edmonton and Calgary for a vocational focus in approximately nine new schools in each city. This new construction gave a vigorous thrust to the concept of vocational education. The new vocational schools or wings incorporated an automotive shop area and a theory classroom. The shop designs were modeled after those in the technical institutes colleges that had been teaching adult automotive courses for some time.

On February 10, 1961, the Department of Education held a meeting that a major affect on the future of Vocational education, and three significant conclusions were made:

1. There was a need for pre-employment training for the trades as the technical institutes moved away from this field.

2. High school vocational courses would have to be very specific and not exploratory. As a consequence, students would spend a greater part of their time in the shops, teachers would need at least journeyperson's qualifications, a close liaison with industry would be necessary, and the students' other courses in the school should be related to trade training.

3. Articulation with the Institute of Technology should be provided.

The shift from the less exploratory model to the trade or individual model was manifest in the college curriculum and remains the underlying theme in the colleges' program today. This period established vocational education as a viable choice for students who wanted current skills to seek employment after completing high school. The subject areas of most high schools consisted of the following trades: welding, sheetmetal, autobody, automotives, machine shop, food preparation, commercial art, building construction, printing, and electronics; and some include unique courses in electrical and aviation mechanics. The Department of Education (now called Alberta Learning) then decreed that all graduates must possess 35% of the credits from the vocational subject areas to receive a diploma in vocational education. At this time 100 credits were required to graduate; this meant that one third of students' high school classes would directly prepare them for the world of work. Because of this requirement, students who planned to complete matriculation in three years would not be able to take a vocational education subject after Grade 10. These changes had little effect on students who had planned to complete a four-year high school program or on those who took courses in both the vocational and the matriculation routes.

The inability of the matriculation student to select vocational education courses as options became a major concern of the Department of Education's personnel associated with vocational education. According to Harder (1970), "The more intellectually endowed opt for matriculation, while the slow learners had little alternative. A dichotomy has developed which is unnatural and stigmatizes the vocational programs as second rate" (p. 3).

Industrial arts and vocational education were integral parts of most senior high schools and deemed important parts of preparing students for work and providing them with an education that was believed to be complete in both academic and nonacademic knowledge.

The years 1963 to 1973 were a busy growth period for vocational education. This was also the time when consumer interest in sports and muscle cars was at its highest. Alberta was growing, and the economic future looked secure. These factors contributed to most vocational programs being enrolled to capacity; in particular, the automotive mechanic programs. These programs continued for years with success. In the early 1980s, enrollments in many of the vocational courses declined each year. Concerns arose about outdated curriculum and shop equipment. These conditions contributed to Alberta Education conducting a review of all practical subjects, called the Practical Arts Review. Even before the practical arts review, some schools upgraded equipment if money was available, and some modified the course content to better reflect the newer vehicles. Modification of the curriculum was easily done because curriculum guides suggested general topics and not specific procedures for specific years, makes, or models of automobiles. Throughout the 1970s and 1980s the popularity of the automobile changed slightly, with higher fuel prices significantly affecting students' limited budgets. The fast, large-engine "muscle car" of the late 1960s and early 1970s was being replaced with smaller engines with much better fuel consumption.

By the mid 1980s many automotive programs in Alberta's high schools were beginning to decline in a number of ways. The significant funding from the TVTA had been discontinued by 1970, which led to school and board administrators attempting to deal with the reality of the usually large budgets (compared to academic subjects) required to run the vocational programs. Alberta schools were also feeling the economic stress of the times. Many schools had their budgets for practical arts reduced during this period, and money to upgrade or replace large pieces of shop equipment was virtually nonexistent. However, some schools continued to do well financially through customer service shop fees and by selling parts to supplement the program's yearly budget.

By the late 1980s many significant automotive innovations had made their way into virtually all of the manufacturers' production lines such as electronic ignitions, fuel injection, Anti-Lock Brake Systems and Emission Control Systems; hence the curriculum and shops became outdated. With so much upgrading required in such a short time, some school programs continued to experience declining enrollments, and a few programs closed. There was a significant drop at the high school level when the feeder schools reduced or closed areas of their industrial arts programs. At this time the number of credits required for a high school diploma was increased to include a higher percentage of academic classes, which effected an immediate 20% drop in enrollment in the high school vocational programs.

As a result of the Practical Arts Review, and the loss of any federal funding, Alberta Education developed the CTS curriculum. This eliminated the vocational education programs as distinct programs. The introduction of the Career and Technology Studies curriculum in the mid 1990s was the first major overhaul of the vocational curriculum since the 1960s. The new curriculum was to break down the modern competencies of each trade into strands. The strands, in turn were further divided into one-credit modules. These modules could be arranged in different ways by individual schools. Students could complete and receive credits for any number of modules that they

wished to complete. Typically, each module is based on access to 25 hours of student instruction. With the general educational cutbacks that have taken place in the 1980s and the 1990s, little research has been done to investigate the new Career and Technology Studies curriculum or the success of its predecessor, the vocational programs, and particularly the Automotive Industrial Education Program. With the new CTS curriculum being fully implemented for over three years, it may be too early to get an accurate assessment of the curriculum. However, the transition and initial perceptions should be studied at this time with those involved with the programs. There is a definite need for researchers to collect and analyze data and then report the findings. Regardless of the curriculum changes and the province's shift away from option classes towards more academic courses, the popularity of the Alberta high school automotive programs remains high. Alberta youth seem to recognize the relevancy of the automotive programs in providing them with knowledge in understanding the automobile's various systems and subsystems before they become vehicle owners or become journeypersons in the trade.

CHAPTER III

RESEARCH METHOD

Research Design

The research design used in this study is a combination of approaches from the qualitative and the quantitative realms. A cross-sectional survey instrument was used. Both a Likert scale and an open-comment area were used with each question. The survey was delivered by the researcher during visits to each of the schools. The researcher was present with the automotive teacher at some schools while the teacher completed the survey. Some teachers completed the surveys at their leisure and did or did not return the surveys to the researcher. The return rate of the surveys was approximately 70%. All schools that employed one or more full-time automotives teaching positions in the province of Alberta were included in this study. There were approximately 52 schools eligible to participate of which 36 surveys were used in the study. The surveys were administered from November 1999 to April 2000. Observation and interpretative inquiry were other approaches used to better understand each program during the visits to the schools.

Appendix A includes the ethics review form and the corresponding letters that accompany the survey.

Description of Research Project

I interviewed most of the high school automotive CTS teachers in the province, traveling to the participating schools to assist in administering the survey (see Appendix B). Each survey took about 20 to 30 minutes per teacher to complete. My purpose was to identify aspects of these programs that have contributed to their success and to identify aspects that may be improved upon. In learning more about what teachers have to say about aspects of their own program or in CTS automotives in general, we can suggest ways in which schools, administrators, boards, and teachers can ensure continued

success or improve the delivery of these CTS courses. These initial surveys were part of a foundation for the doctoral candidacy proposal.

The focus of the survey was as follows:

- school questions
- program questions
- staffing questions
- curriculum questions.

Value of This Activity to the General Stakeholders

The specific benefit of this study is that it may help the diverse stakeholder groups understand that there are many variables involved in the growth and decline of the new CTS curriculum in the automotive strand. It should also be noted that not much other research has been done in this area. This means that the stakeholders of the other CTS strands should be cautioned about making assumptions about their particular subject strands, because the research on the factors of growth and decline indicated that each of the affecting factors can be different for other strands of the CTS curriculum.

Value of This Activity to Schools or School Districts

The specific benefit to the schools is that this study may help teachers and administrators in planing and organizing their automotive programs, as well as other trades-based subject areas. The specific benefit to the students is that schools with successful programs are able to more easily identify the systems and areas that the students found most rewarding. Because the majority of the data were gleaned from teachers' perceptions of the automotive programs, they benefited from reflection on their programs and from other teachers' sharing of what they were doing to achieve success in numerous areas of the automotive program of studies.

Value of This Activity to Industry

The specific benefit of this study is that it may help industry understand that there are many variables involved in the growth and decline aspects of the new CTS curriculum in the automotive strand. It should also be noted that not much other research has been done in this area. This means that industry must take these data and build upon them themselves if they wish to get answers to their many questions concerning the factors that affect them in relationship to the broad scope of education. It is important that industry understand that the continuity issue and other issues related to the automotive strand of CTS are concerns for all those involved, and yet no future plans to research these concerns have been found by the researcher of this study. With industry short of journeyperson mechanics and student perception surveys indicating the popularity of the automotive programs in high schools, we must continue to try to merge the students with industry to better serve the many communities of Alberta that require these skilled individuals.

Personnel and Schools

The schools were visited, a survey was administered, and a semi-structured interview of the automotive teacher was conducted. The researcher completed a shop-observation checklist of various aspects and items pertaining to the school's program.

Sample Selection and Procedures

A survey was administered to the teachers of the programs in the province of Alberta. Only those schools with approximately one or more full-time automotive teachers were surveyed. The researcher visited each school to assess the program and shop facility and to discuss the survey with the teacher. This observation of each shop was to assist the researcher to further understand the factors that could contribute to the growth or decline of a particular school's program. A check list/observation sheet type instrument was used to gather the data. As well, the researcher gained insight into

teachers' future plans to continue at the school, request a transfer, retire, or possibly retire early. For example, one school had to advertise out of the province and hired a qualified journeyperson teacher from another province at an extra cost to that school. A few district/board personnel departments had consulted the researcher about available journeyperson/teachers for open positions.

Delimitations and Limitations of the Study

A number of delimitations and limitations are relevant to this study.

Delimitations

Industry was not chosen as a recognized stakeholder for this study because their influence is clearly directed to the college curriculum through local and provincial advisory committees.

Limitations

All of the participants surveyed were males because the defined sample population of automotive teachers in Alberta contained no females. The teacher survey instrument was administered to those teachers with full-time teaching assignments in the automotive subject area. This study reflects the views of the teacher sample population held at the given time, fall 2000. This study was limited by the reference sources on the history of growth and decline aspects from other time periods and recent literature of those same aspects in other subject/strand areas of the new Career and Technology Studies curriculum. The findings were limited to the population of the CTS mechanics strand/automotives trade subject area, and any generalization to other populations of trade subjects/strands should be done with caution.

CHAPTER IV

DATA ANALYSIS

Table 1 and Analysis

Table 1

What Percentage of Shop Work Is Customer Service?

School no.	Percentage	Comments/explanation
1.	50	*No response*
2.	60	Mec10 -10% Mec20 - 40% Mec30 - 80%
3.	75	Students' work is more precise, and they get more out of the variety of vehicles and problems
4.	50	A number of the vehicles used as "customer service vehicles" are students' or friends' vehicles.
5.	20	*No response*
6.	75	*No response*
7.	90	Donated/Shop vehicles tend to be abused by students and don't teach responsibility or ownership and pride of workmanship.
8.	75	*No response*
9.	15	CTS does NOT [*Sic*] work well with customer service.
10.	95	We have no "shop vehicles"; all are provided by students, staff, and customers. All are roadworthy vehicles.
11.	30-60	Depending on cars in, course , and module.
12.	60-70	Grade 10 - very little Grade 12 - 80-100%
13.	15	*No response*
14.	10	*No response*
15.	100	*No response*
16.	90	*No response*
17.	75	Mec20 - 40-50% Mec 30 - 80-90%

(table continues)

School no.	Percentage	Comments/explanation
18.	0	We do not do "customer service," but the students perform repairs on their own vehicles. They can "take on jobs" for friends & relations, etc.
19.	70	And approximately 30% student projects.
20.	96	Customer vehicles provide true auto experience for the students; i.e., changing brakes on a bench model does not show you know how to jack a vehicle safely, remove wheels, torque wheel nuts, etc.
21.	30	*No response*
22.	80	*No response*
23.	50	Most of the work in junior auto is done on donated cars.
24.	0	Previous to this year it was 80-85%. Last year we had significant customer grievances, so we abruptly stopped customer service.
25.	50	Each student has 50% of the shop time based on required projects (procedures).
26.	90	Customer, community service, staff.
27.	90	*No response*
28.	65	I use "real world of work" hands on. Customer service approach to teaching mechanics.
29.	95	*No response*
30.	50	Grade 10's do almost no customer service work. Grade 11 and 12 do some.
31.	95	*No response*
32.	70	*No response*
33.	80	*No response*
34.	0	This is a *Mechanics* program, not an *Automotives* program. We have 67 min. classes. The students work on their own vehicles. The students lack the skills where I would feel comfortable to let them work on customer cars.
35.	80	Only first year students work on non-customer service. Some as they advance start in first year customer service.
36.	0	I teach grade 10 &11—3 credits each—8 weeks, and time is not on the side of customer service.

What percentage of shop work is customer service?

This survey question has significance to automotive programs in that it ascertains the value of incorporating customer service into Alberta's high school automotive programs. Of the surveys collected 100% of the teachers responded to this question. The average percentage of customer service is 58.22%, which by itself suggests that Alberta's programs are incorporating customer service into their programs. This average does not mean that the remaining 42% are not doing customer service. It means that on an average each teacher is doing 52% customer service. Each teacher may be doing no customer service in their Grade 10 classes and may be doing 100% in the advanced classes, or any portion thereof. The underlying theme found in the comments from the teachers who completed this survey question indicate that more customer service is beneficial to automotive programs and that the new CTS curriculum does not work as well with customer service as did the previous curriculum.

It seems that students prefer customer service for several reasons. The students would like to work on their own vehicles, then those of family and friends. There is a sense of relevance as the repairs exhibit the usual reality of rusted bolts worn parts and the important diagnosis aspect of determining the cause of the condition. There were only two schools surveyed that reported doing no customer service. Again the underlying theme is that customer service is a positive aspect to the program but the new curriculum has limited its use. The new CTS curriculum does not allow for vehicle repairs intended to be done during one module to be repaired when customers service work is available during a different unrelated module.

Comments also indicate that students respect and appreciate customer service vehicles, as shop vehicles are usually in such a low state of repair and appearance that students indicate that they would rather do relevant and more meaningful repairs. Student vandalism to shop vehicles was indicated as high, while low to customer vehicles. Students want and appreciate the written or verbal praise that they can get after repairing

a customer's vehicle. Teachers indicate that customer service has a sense of validating the program and contributing to the community in a positive way. Students want to bring in their own vehicles or vehicles of people they know for the sense of achievement and relevance. Most high schools with successful customer service programs have an order of priority when soliciting and booking customer service vehicles for repair. Student's vehicles have first priority, then school staff and then the general public. The teacher usually has to determine whether the year, make and model of the vehicle would be a good choice for the learning of the course curriculum. An example of this might be a larger truck, which is too heavy for a school's hoist, or because the school lacks necessary repair tools for rare makes or models.

With experience servicing customer vehicles, the student's transition to college automotive programs would have a higher level of continuity as the colleges have always and still continue to use customer service as the most efficient way of providing adult students with meaningful hands on experience. Most high school teachers indicated that students gain only a part of the knowledge when working on shop vehicles, because most or all typical wear indicators have disappeared as worn parts were replaced with new ones the first time they were repaired. They also indicated that the usual rust or occasional compound problems found with customer vehicles are experienced only on the initial repair of a routinely overhauled shop vehicle.

College instructors, when interviewed, and high school teachers both agreed that extra time is required to solicit, book, and administer customer service. It is for this reason that colleges have tool crib attendants who work with the instructors to solicit, book, and administer the customer service. High school automotive customer service takes more of the teacher's time, and the reality is that the teachers reduce customer service as a coping mechanism. Teachers have also indicated that the new CTS curriculum has lent itself to higher class sizes and three-credit, eight-week courses, and it is difficult to solicit, book, administer, and then house the work-in-progress vehicles.

Schools with five- or six-credit course bundles are having greater success at customer service for this reason and for customer satisfaction, because the customer's vehicle is not being housed as much between the classes of the students who are doing the repair. Customers are less likely to have a school do a repair if a typical single-day repair approaches three to four days. These short three-credit, eight-week courses then typically have students from another class continue with the previous class's customer service, which fragments the learning process of students in both classes. Schools with successful customer service programs generally timetable the five- or six-credit Grade 10 course and 10-12 or more credit Grade 11 and 12 courses to capitalize on the advantages of having a customer service aspect to their program.

Table 2 and Analysis

Table 2

How Many Shop Vehicles Does Your School Have?

School no.	Number	Comments/explanation
1.	5	All have been vandalized.
2.	8	Sometimes donations are up and the cars are turned over as they become unuseable [*Sic*] or new cars come in.
3.	2-5	Depending on year, donations and carryover.
4.	6	*No response*
5.	9	*No response*
6.	5	*No response*
7.	4	1-Race car- 3 donated vehicles mainly used for Grade 10 Introductory Mechanics
8.	3-4	Varies
9.	4	4 X 1st Place prizes at Sait & AMA skills. [*Sic*]
10.	0	*No response*
11.	5	*No response*
12.	3	1983 Buick, 1986 Pontiac 6000, 1995 Chrysler Laser all through private donations
13.	5	These are vehicles that have been donated to our automotive program.
14.	6	*No response*
15.	0	*No response*
16.	3	*No response*
17.	8	We have a lot of vehicles donated to the school, so when the cars become unusable they are turned over.
18.	12	I buy beaters for $50. When we are finished with them they go for scrap.
19.	4	We accept donated vehicles and strip them as part of the introductory level

(table continues)

School no.	Number	Comments/explanation
20.	8	I have found that shop vehicles deteriorate quickly because system are not designed to be R&R 100 times.
21	1	*No response*
22.	2	My shop has 2 vehicles, This number changes throughout the year
23.	5	We usually have 5 per semester / then recycle
24.	2	Project vehicles- ‘82 Mazda 626 & ’86 Camaro - no engines in either car. Both cars donated for Grade 12 engine swap use.
25.	1	*No response*
26.	5	*No response*
27.	3	had 1 more- had to tow away from vandalism when outside [*Sic*]
28.	1	*No response*
29.	0	*No response*
30.	9	Student do module work on shop vehicles if customer work is not available. Students who finish module work early do customer work. [*Sic*]
31.	0	*No response*
32.	3	*No response*
33.	3	*No response*
34.	3	They are used for work study in place of customer vehicles.
35.	3	*No response*
36.	8	(in one shop) (none in senior shop) the community recognizes our need for shop units and has been very supportive of my offering. [*Sic*]

How many shop vehicles does your school have?

This survey question has significance to automotive programs in that it indicates to the reader why schools have certain numbers of vehicles and what might be the ideal number to increase the learning for students. Virtually all schools possess shop vehicles. Only four schools surveyed indicated that they possessed no shop vehicles. The average number of shop vehicles of the schools surveyed is 4.2.

There is a need for shop vehicles as a part of the program. The major concern for having shop vehicles, as indicated by the surveyed schools, is the issue of vandalism. It seems that students have little respect for these shop cars. Students are more respectful when doing repairs on their own vehicles or on customer service vehicles. Shop vehicles are generally in a poor state of repair and appearance, and students would rather do more relevant and meaningful repairs. Some schools do a higher percentage of customer service and, therefore, require fewer shop vehicles. In order to facilitate an easier transition, students who continue to the adult college automotive programs, in which few, if any, shop vehicles are used, the customer service aspect at the high school level prepares them. It also eases a direct transition into what would be expected in an automotive service shop. Alberta's colleges have always and still use customer service as the most efficient way of providing adult students with meaningful, hands-on experience. The Alberta high schools surveyed indicated that students gain only a part of the knowledge when working with shop vehicles, because most or all of the typical-wear indicators disappeared when worn parts were replaced with new ones the first time that they were repaired. It was indicated that the unexpected but usual reality of rusted parts or compound problems found with customer vehicles is only experienced on the initial repair of a routinely overhauled shop vehicle.

Some schools would like to have more shop vehicles, but the physical storage space both inside and outside is limited. Storing shop vehicles outside, unprotected, constantly results in vandalism. What is required is a lockable storage compound. Vehicles can then be brought into the shop as required, and vandalism will be reduced. Having shop vehicles in a locked compound ready for student use is also beneficial when customer service vehicles are lacking or when students are idle. Vehicles stored in shops could have a removable car cover placed over them to deter vandalism when they are not being used. This cover also keeps the shop vehicles clean until they are required for use.

Many schools possess shop vehicles that are used in extracurricular education, such as racing cars. These types of shop vehicles can contribute to a school's program but take up valuable space both inside and outside in lockable compounds. In addition to race vehicles, some schools have received donations or have won shop vehicles from automotive manufactures. These new vehicles can contribute to a program, but again storage may be an issue. These new vehicles have no wear and therefore do not lend themselves well to repairs. However, these types of vehicles make excellent diagnostic simulators because all related subsystems of the vehicle are in working order.

Many schools receive donations of unwanted vehicles. These vehicles are usually older and require many repairs. Because the schools cannot afford to repair these vehicles, they become parts cars, taking up space in shops and compounds. Some programs have found success with these vehicles by having the Grade 10 classes completely disassemble and label all parts of the vehicle and fill a metal bin, for which the school receives money for the metal tonnage. As the vehicle is disassembled, the teacher can present specific parts or assemblies to the class indicating typical wear or interesting features. Students can also make cutaway teaching aids from the components of these vehicles, which can benefit future classes and the student in understanding the workings of the component.

The underlying theme is that shop cars have their place in the high school curriculum, but proper storage of these vehicles is the major issue and contributing factor to success.

[illegible]

Table 3 and Analysis

Table 3

How Many Students in Your School Are Registered in Grades 10, 11, and 12 This School Year?

School no.	Number	Comments/explanation
1.	1,200	*No response*
2.	200	Approximately 100 per semester
3.	1,060	Total school enrollment
4.	650	*No response*
5.	2,400	*No response*
6.	2,400	*No response*
7.	1,254	*No response*
8.	900	*No response*
9.	350	270+ Grade 10; 60+ Grade 11; 20 Grade 12 There is no more room for students. Shop goes 7.5/8 for the year.
10.	1,800	*No response*
11.	300	*No response*
12.	1,500	*No response*
13.	1,175	*No response*
14.	1,200	*No response*
15.	950	*No response*
16.	2,000	*No response*
17.	200	100 per semester
18.	120	*No response*
19.	*No response*	Grade 10 – 291; Grade 11 – 275; Grade 12 – 320. Plus bridges Grade 8/9 Senior Pre-employment. The school population is approximately 900+
21	1,900	*No response*
20.	900	*No response*

(table continues)

School no.	Number	Comments/explanation
22.	1,400	student population of just under 1,900 Grade 9-13. [*Sic*]
23.	250	200 – 250 – we usually have four program of Junior pre-semester MAX 26 student per class Senior 11 & 12 – 50 per semester.
24.	800	Total school population – 800. Due to course placement and only one full-time automotive teacher, we cannot fulfill all of the student requests.
25.	129	10 – 67; 11 – 34; AS – 16 – 3; AS – 26 – 1; AS – 36 – 1; 12 – 19. 4 – career transition (work in businesses downtown not work experience) [*Sic*]
26.	2,200	*No response*
27.	1,987	*No response*
28.	1,380	Too many students for the size of the school (school built for 1,250 students).
29.	1,200	*No response*
30.	1,600	*No response*
31.	1,200	*No response*
32.	300	*No response*
33.	540	*No response*
34.	1,322	This school was built for a maximum of 1,100. We are severely overcrowded. Money is the bottom line, I guess.
35.	2,378	*No response*
36.	200	Grade 10; 80 Grade 11; 20
		Grade 12. Two shops – 1 FTE, 1- 1/2 TE teachers.

How many students in your school are registered in Grades 10, 11, and 12 this school year?

The significance of this survey question is to identify the possibilities for filling automotive courses and timetabling strategies that might benefit these programs. The initial pilot study indicated that the automotive programs are the most popular CTS strand in those schools that offer CTS mechanics. It is probable that these programs could all be full if proper variables were addressed.

Because the automotive strand of CTS consists of virtually all male students, it quickly becomes obvious that over half of the school's population could still contribute to program growth. The fact that few male students have acquired many mechanical skills and/or much mechanical knowledge before Grade 10 should encourage automotive teachers and school counselors to provide equal opportunity for females to enroll in automotives. Schools have also had success with offering automotive classes that are based more on vehicle ownership than on repair. These vehicle ownership classes have been a great way of introducing both male and female students to the rest of the automotive program. The new CTS curriculum easily allows for schools to select a few of the automotive strand modules that would not interfere with the balance of the program. English as a Second Language (ESL) automotives has also been successful because the ESL students appreciate the change to hands-on learning, and the lower teacher-student ratio of the ESL class makes it easier for the teacher to inspire these foreign students to learn about automotives. Again, some of these ESL students would then consider taking the regular Grade 10 automotive program once their communication skills had reached an acceptable level.

Feeder-school recruitment seems to be another area contributing to the growth of automotive programs. Automotive teachers have visited feeder schools with good success in creating interest, which leads to students inquiring about and eventually enrolling in the automotives program. Feeder schools can be invited to visit the high school to view the automotive shop areas. There are various methods used to accomplish this with very different results. School tours of all CTS and academic areas contribute the least to automotive program growth, because these tours are in the automotive shop area for 5 to 15 minutes, and the students have already been to 10 to 15 other CTS and/or academic course areas during the tour. Most administrators, teachers, and students agreed that all those involved are overwhelming by this method of conducting tours, although they have their place in orienting the student in a general way to the choices that are available in

that particular high school. The more successful way of increasing enrolment in a automotive program involves collaboration on the parts of the feeder school teachers and the high school teachers for continuity in the CTS subjects, Part of the process entails more individual junior high field trips. Junior high school field trips that are arranged in this fashion have been very successful in male and female students choosing automotive when they proceed to Grade 10.

Junior high school industrial arts teachers usually welcome a meeting of the automotive teachers to discuss program and skill continuity from junior to senior high schools. Some automotive high schools have produced an amateur 15-minute video and have made copies for the feeder schools, with tremendous success. The underlying theme is that unless the students of the feeder schools know about the automotive programs and specifically request to be in the automotive program, few students actually end up in these programs. Some high school administrations have not allowed students interested in individual programs to visit because they indicated that it is unfair to programs that do not offer such tours. Some high schools do not allow individual program promotional videos to be distributed to feeder schools because of the complaints arising from teachers of other programs that do not offer such videos. Some schools have produced a video for all of the CTS programs with marginal success for the automotive programs because, according to most teachers and students, there is an overwhelming diversity and complexity of CTS courses (6 to 15) offered at the high school level. This diversity does not make a 15- to 30-minute amateur video feasible.

The automotive teacher must have a clear vision of the automotive program and be able to convey this to the administration and the school counselors who are responsible for timetabling and filling of student course requests.

Schools offering CTS courses that have been designated as baccalaureate schools should be aware that CTS teachers have to educate feeder school students about their programs. It seems that the professional advertising campaigns for baccalaureate schools

leave people with the impression that vocational types of programs and courses are being replaced by the new academic baccalaureate program.

Table 4 and Analysis

Table 4

How Many Students Are in Your CTS Program?

School no.	Number	Comments/explanation
1.	140	*No response*
2.	*No response*	*No response*
3.	120	Registered in mechanics.
4.	140 – 150	Automotives – 8 courses x 5 modules/year; 16 – 20 students/course
5.	*No response*	60 Auto 22; Auto 32; Auto 12; Autocare 22X *[Sic]*
6.	340	*No response*
7.	278	6 Sections of Intro Mechanics; 7 Sections of Inter/Adv. Mechanics; Average 20 – 23 students per section.
8.	140	*No response*
9.	*No response*	School wide. *[Sic]*
10.	115	60 in the first semester; 20 of whom are taking 10 credits. 55 in the second; 10 of whom are taking 10 credits.
11.	100	*No response*
12.	120	Grade 10 – 60; Grade 11 – 40; Grade 12 – 20.
13.	*No response*	*No response*
14.	170	*No response*
15.	85	75 – 10's; remainder 20/30 lower than normal because of extenuating circumstances.
16.	*No response*	*No response*
17.	36	Senior level – numbers not quite as high as at introductory level.

(table continues)

School no.	Number	Comments/explanation
18.	120	*No response*
19.	147	This is the number of students who registered in the Introductory Mechanics Level. My program has 143 registered over the year.
20.	100	Throughout the 99-2000 year I will teach approximately 100 students.
21	?	*No response*
22.	48	My classes only.
23.	2,000	We have 17 CTS areas. 17 Teachers x 2 semesters x 3 classes pre semester x 26 average students per class.
24.	180	Only one full time teacher. I taught seven out of eight classes to accommodate as many students as possible.
25.	124	*No response*
26.	1,000	*No response*
27.	*No response*	Approximately ½ or more of school population.
28.	250 – 300	*No response*
29.	170	*No response*
30.	190	*No response*
31.	170	*No response*
32.	1,000	*No response*
33.	150	*No response*
34.	175	There are few options; therefore, I get many students that should be in some other option.
35.	150	*No response*
36.	1,000	Guessing.

How many students in your CTS program?

The significance of this question was to initially show the popularity of the automotive programs throughout the province. The data reveal an underlying theme that a disparity exists between the number of teachers at a particular school and the number of possible students registered in the programs, possibly because the CTS curriculum has

resulted in some schools changing their typical shop-course timetable to shorter class times of 35- to 50-minute blocks, and these students receive automotives every second day throughout a semester. This practice raises the number of students that a particular teacher meets, but lowers the number of credits offered in each course. The program is usually organized in three-credit bundles, which the automotive teachers find results in classes that are too short for students to arrive, dress, go into the shop, do shop work, and clean up. It seems that these CTS timetables have not been clearly thought out, because the teacher has to now solicit, book, orchestrate, and warehouse customer service work for all these students in the shop. The main problem is that vehicles that are being worked on have to wait until the next class to be completed, and with these short periods, students receive a relatively short on-task shop time to actually perform the repair. The total time to set up the shop bay with the vehicle and tools and the daily clean-up takes generally the same amount of time regardless of the total length of the class period. It seems that with the recent curriculum change all strands are being thought of as having the same requirements to be successful. An example of this would be the length of these class periods. Other CTS courses with short class/lab/shop setup and cleanup time might be feasible in short periods, but this does not work with automotives. A longer period allowing the students to come in every day significantly changes the potential and dynamics for a successful automotive program. Students would have a much longer time on task repairing a vehicle, with the initial setup and cleanup generally remaining at about 15 to 30 minutes. Another example of when time-tabling becomes a detriment to the automotive programs is when periods are alternated throughout the semester. In this case a three-credit course is arranged in a period every second day. As a result the teacher is unable to solicit customer service work because the customer would have to agree to leave the vehicle for days rather than hours. This is also true when setting up shop vehicles, because the same number of shop bays must be utilized by many more students to ensure the same learning situation. Another example is when classes are time-tabled at

too many different times. Here the periods are doubled up on Tuesday and Thursdays, or the periods rotate so that they are not at the same time every day. For some CTS courses these timetabling formats matter little, but with automotives they can greatly affect the ability to grow a successful program. Customers and parts delivery people have to be made aware of these timetables to bring in their vehicles and drop off parts and so on. All teachers are allowed preparation time, and automotive teachers generally use some of this time to visit suppliers, tool houses, and automotive dealerships. Again a simple timetable format could dramatically influence the ability to grow and maintain a successful automotive program.

Some schools are under the impression that the automotive-strand timetabling can be highly creative due to the new CTS curriculum. This has proven to be not the case both at the high school level and the college level. Some schools bundle credits into groups and/or schedule their semesters in a fashion that hinders the greatest success of the automotive program. Bundling of credits might seem to be a good idea until the outcomes to the shops, students, teachers, and customers are considered. In a given semester a teacher working with this bundle method of student placement might have one three-credit class every second day, and a part of that same class might have another period in between these periods in a 6-credit bundle. Further, some timetabling computers can place a third group of students in that same class on the same starting day but with two extra periods between the regular meeting times of the three-credits students. Teaching is hampered because the teacher has to attempt teaching multiple blocks simultaneously. This means that the teacher must prepare two or three lesson plans for each class, with customer service booking to adequately supply the students with meaningful shop experiences. Even labs can become nightmares. Teachers agreed that it is impossible to demonstrate two or three labs simultaneously, and the logistics of moving heavy automotive lab parts (such as a transmission lab with a brake lab) to enhance students' experience becomes impossible. These are the situations that CTS automotive teachers

have suggested are so outlandish by attempting to do this, it results in CTS teachers having one of the highest incidences of stress leave. Colleges throughout the nation have tried various methods of timetabling automotive educational programs and have always returned to the proven method of half theory and half practical, involving only one lesson plan and supplying the student with relevant customer service experience in the typical shop atmosphere in blocks that are two to three hours in length (with a short break). Different methods can be tried or curricula changed, but research and trials of these new methods should be conducted to ensure reasonable success in the outcomes and experiences of the student and program.

Some schools are utilizing the new CTS courses in different ways. Some are simply organizing a bundle of courses to copy what was taught in the old 12, 22, 32 curriculum. These schools can usually be identified by five-credit semesters. The old curriculum was based on five credits per semester course. Other schools have taken the advantages of the new CTS courses to choose six-credit semesters while choosing the individual courses that can be offered in a logical format and with the existing shop equipment. Because not every school has for example: an air-conditioning charging station, for example CTS allows schools to choose courses that work with the school's equipment and specific types of customer service.

Some boards are presently drafting CTS policy guides to provide information and standards to the trade areas as a whole. These are the first steps in organizing the trade subject areas. These policy guides are definitely a positive step towards organizing the programs of Alberta's CTS high school automotive curriculum. Though these draft policy guidelines are still in their infancy, they seem to be similar to what has already been tested and refined over the years within Alberta's colleges.

Table 5 and Analysis

Table 5

How Many CTS Teachers Are Delivering Automotive Courses at Your School?

School no.	Full-time	Part-time	Comments/explanation
1.	1	¾	*No Response*
2.	1	3	*No Response*
3.	1	1	*No Response*
4.	1	1	Part time: science/physics teacher. Teaches one introductory course per year with the help of an aide.
5.	3	1	60 Auto 22; Auto 32; Auto 12; Autocare 22X
6.	3	0	*No Response*
7.	1	2	One teacher teaching Intermediate and Advanced Mechanics. Two teachers teaching Introductory Mechanics, plus they teach other CTS Courses.
8.	1	1	*No Response*
9.	2	1	*No Response*
10.	1	0	*No Response*
11.	3	*No Response*	*No Response*
12.	1	*No Response*	*No Response*
13.	1	2	*No Response*
14.	1	*No Response*	*No Response*
15.	1	*No Response*	*No Response*
16.	1	1	*No Response*
17.	1	3	*No Response*
18.	1	½	*No Response*

(table continues)

School no.	Full-time	Part-time	Comments/explanation
19.	1	1	Full-time teacher – 7/8 all levels. The part-time teacher ¼ - ½ Introductory Levels.
20.	1	*No Response*	*No Response*
21	1	¾	*No Response*
22.	2	*No Response*	*No Response*
23.	1	3	1 Full-time; (1 junior 2) (2 junior x 1) teachers.
24.	1	*No Response*	*No Response*
25.	1	124	Have an assistant who also is a mechanic.
26.	3	*No Response*	*No Response*
27.	2	*No Response*	*No Response*
28.	1	1	*No Response*
29.	2	*No Response*	*No Response*
30.	2	*No Response*	*No Response*
31.	1	1	*No Response*
32.	3	0	*No Response*
33.	1	0	*No Response*
34.	1	0	The workload is too much for one person. Ordering supplies and materials, repairing equipment, setting up and organizing labs, preparing lectures, and teaching.
35.	3	*No Response*	*No Response*
36.	1	1	(1 approximately half time). September 2001 will see only one and I'm getting tired and may not be here!

How many CTS teachers are delivering automotive courses at your school?

The significance of this question is to give the reader an idea of the numbers of automotive teachers in our province and to offer ideas on the dynamics of this population in the past, present, and future. Alberta has approximately 80 teachers teaching in the automotive strand. Some of these teachers have teaching assignments in automotives only a part of the time. These part-time teachers are utilized because it is becoming increasingly difficult to find full-time journeypersons/teachers. It is also very difficult for a particular school to expand its automotive program fast enough to hire a journeyperson and have enough students to create the necessary class sizes immediately. Schools and their boards have not planned for this situation and are surprised to find that virtually all journeyperson mechanics will not accept teaching assignments that initially consist of having to teach in other subject areas until the program grows. Most schools and boards then place a part-time non-journeyperson/teacher in the automotive program to attempt to grow it until they can offer a full-time assignment to a journeyperson/teacher. This fails because the program struggles without a full-time journeyperson/teacher. The non-journeyperson/ teacher is allowed to teach only the courses that do not stipulate the presence of relevant journeyperson. Most schools find that these students rarely continue to take automotives, and those that do are ill equipped with the skills and knowledge to continue with the intermediate courses. Part-time automotive teachers often teach in other areas of the school and find it difficult or impossible to solicit, book, and administer customer service work. Hence most part-time teachers feel inadequate to repair road-going vehicles and therefore work on shop vehicles or do mostly theory and class/shop demonstrations to attempt to achieve student course outcomes.

Schools that have successful automotive programs have done so by employing a journeyperson aide who assists in all aspects of the shop with the exception of student instruction. The number of students can then be larger. This arrangement continues until such time as a journeyperson would be hired and the journeyperson aide released. The

new teacher and the existing teacher would usually have slightly lower student numbers until further growth is established. Some schools find that hiring a journeyperson aide is a viable method of increasing student numbers slightly while staying within budget. These successful journeyperson aides are selected by the teacher, not the administration. It became apparent that not all persons with an automotive ticket would be successful in a school shop environment. In Table 10, respondent 9 supported this view: "We have had aides and they are more trouble then they are worth." Another reason that schools have been unsuccessful in hiring journeyperson aides is that some schools or boards pay them as a nonskilled aide. This low wage virtually guarantees that the only person who would accept the position would be one who would be moving on or a journeyperson who has very few redeeming qualities or a questionable work ethic. There are some very interesting and positive aspects for schools to consider in developing their automotive programs with the strategy of hiring a journeyperson aide. With two skilled supervisory people in the shop, the flow of customers, tools, lab setups, and general shop administration is greatly enhanced. Most of the teachers in these situations suggested that the journeyperson aide do shop administrative duties while the teacher is doing classroom theory. Some of the classroom lab setups were also the responsibility of the aide. With the ever-increasing reality that most of our journeypersons/teachers are close to retirement and there are very few journeypersons/teachers to hire at this particular time, the journeyperson aide may be a viable way of continuing to accommodate students until journeypersons/teachers are available. Some schools are attempting to place a journeyperson aide with a non-journeyperson/teacher. This has failed because the students quickly realize that the teacher lacks the skills and knowledge to repair vehicles. In turn the students ask the aide to teach them the concepts and skills to diagnose and complete the repairs. The teacher becomes frustrated, as does the aide, who cannot teach without consent of the ATA and the superintendent's permission. Some of the highest

incidences of stress leaves are in these CTS shops, and creating further mismanagement is not an option.

Some schools placed in the position of not having a journeyperson/teacher have sublet their automotive courses out to colleges with success. These colleges provide two instructors for a class of 32 students and follow a course flow chart of the courses agreed upon. This has its advantages because the college's equipment is current, as are the skills of the journeyperson/teacher. These schools have stated that they can financially break even with the 16:1 student /teacher ratio when they are reimbursed by Alberta Learning for the CTS automotive courses.

Some schools also attempt to ease the busy schedule of the teacher by means of a special-project student. These students are usually in Grade 12, have had extensive automotive courses in the school, and are very familiar with the shop procedures. They assist the teacher with aspects of customer service, tool allocation, and tool repair. They also are very useful as a model for the other students while they are in the shop. These special-project students are highly respected by their peer students because of their knowledge of the vehicle and the established shop procedures.

Table 6 and Analysis

Table 6

How Many of Those Teachers Possess Journeyman Mechanics Certificates?

School no.	Number	Comments/explanation
1.	2	*No Response*
2.	2	*No Response*
3.	1	Necessary to continue to produce students interested in mechanics as an occupation.
4.	1	Each of our CTS Areas employ Journeymen Technicians/Qualified individuals who also posses a minimum BED.
5.	3	*No Response*
6.	3	*No Response*
7.	1	*No Response*
8.	1	*No Response*
9.	2	*No Response*
10.	1	*No Response*
11.	3	*No Response*
12.	1	*No Response*
13.	2	*No Response*
14.	1	*No Response*
15.	1	*No Response*
16.	1	*No Response*
17.	2	*No Response*
18.	1	*No Response*
19.	1	Full time only!
20.	1	I find many new CTS student teachers downplay the importance of needing a journeyman certificate to teach Auto!!
21	1	*No Response*

(table continues)

School no.	Number	Comments/explanation
22.	1	I have a Journeyman Autobody Certificate with Gold and Red Seals.
23.	2	One auto; one heavy duty.
24.	1	I have an Interprovincial Journeyman's in MUMR [*Sic*] and a Provincial Journeyman's in Heavy Duty Repair.
25.	1	Plus two to three updates on Journeyman courses.
26.	3	*No Response*
27.	1	*No Response*
28.	1	*No Response*
29.	1	*No Response*
30.	2	*No Response*
31.	1	*No Response*
32.	3	*No Response*
33.	1	*No Response*
34.	1	*No Response*
35.	3	*No Response*
36.	2	*No Response*

How many of those teachers possess journeyman mechanics certificates?

The significance of this question is to provide the reader with information as to the number of journeyperson teachers in the province as well as how many of those teachers are non-journeypersons. When the data were collected, virtually every school in the province was visited. This means that there are just over 80 teachers with full- or part-time assignments in the automotive strand. Table 6 indicates that approximately 54 participant teachers responded that they were journeypersons. Interestingly, of the few teachers who are nonjourneypersons, most did not return their survey. The underlying theme is that our automotive strand has approximately 65 to 70 journeypersons/teachers. It must be noted that virtually all journeypersons/teachers have assignments that consist of all automotive courses, whereas the nonjourneypersons/teachers have assignments

with few automotive courses. At this time most of our schools have the skilled journeypersons/ teachers who are required to teach the courses that are mandatory in the automotive strand. The articulation agreement with the Provincial Apprenticeship Board also dictates that the majority of the courses that the students require to be able to challenge the apprenticeship exam and gain advance standing must be taught by a journeyperson.

Students recognize very quickly when an automotive teacher lacks the repair skills and knowledge to repair vehicles. In such cases and course satisfaction drops dramatically. Customer service ceases to exist almost immediately because unskilled teachers cannot diagnose and repair customer vehicles. Previous customers usually refuse to bring their vehicles to schools for repairs.

It also seems that students of the automotive strand want to be inspired. This inspiration seems to stem from the public's interest in the automobile. The automotive students usually have outside school automotive interests. Not every CTS strand inspires students. This situation might be explained by acknowledging that a journeyperson usually has spent more than the four years to gain the status. Journeypersons/teachers have usually 4 to 20 years of automotive repair experience after receiving their journeyperson status. This experience usually gives the journeyperson/teacher a complete understanding of all aspects of an automobile. Students quickly respect the tradesperson's skills and knowledge. The daily shop classes and labs quickly point out the strengths and weaknesses of those teachers who can diagnose and repair vehicles. To further illustrate the acquired skills and knowledge of Alberta's journeypersons, comparing equivalent experiences and schooling for teachers of non-trades might provide insight. A typical English teacher has a Bachelor of Education degree with a major in English consisting of 8 to 10 university English courses. Some English teachers do possess an after-degree in English that begins to reflect the equivalent education, though, not the practical experience. In comparison to the trades teacher, the English teacher would have had to

work as a writer or for a publisher for from 4 to 20 years to have acquired the skills and knowledge that the tradesperson/ teacher has. This is why program growth ceases almost immediately when a non-journeyperson is placed in an automotive teaching assignment.

The colleges of Alberta would never entertain the idea of a noncertified journeyperson being hired as an instructor. The colleges also have a policy that states that the college shop aides be of journeyperson status, and both the college teachers and aides continually have to take the journeyperson update-courses and/or audit courses before they are given teaching assignments in those courses. Adults who are apprentices or who already have journeyperson status and who are upgrading, sense in the first few hours of instruction whether the instructor has the skills and knowledge of the course content and can handle the diagnosis and repair of the customer service vehicles on which the students will be learning. Some colleges specify that instructors must first audit every course before they are assigned to teach them. Some boards have been writing policy that specifies that the CTS strands must be taught by a journeyperson/teacher of that particular strand. Many boards have indicated that no journeypersons/teachers replied when the board was advertising the position.

It was discovered in the initial pilot study of education's stakeholders that Alberta Learning is now anticipating that the university's collaboration with the Northern Alberta Institute of Technology (NAIT) in the CTS teacher-training program will provide schools with skilled and knowledgeable CTS teachers. Talks of this collaboration have not continued since the year 2000. These three-week college courses in the various CTS strands are better suited for the multi-activity shop, those found in the junior exploratory, introductory levels. As respondent 20 commented, "I find that many new CTS student teachers downplay the importance of needing a journeyman certificate to teach Auto!!" Again, the underlying theme is that the mandated course outcomes and the expectations of students are that teachers of the automotive strand will have the trade skills and knowledge to repair vehicles. Alberta Learning may or may not be aware of the vast

experiences and skills that accompany most of the journeyperson teachers in the province and that it is difficult to find these attributes in nonjourneyperson teachers.

The Alberta Teacher's Association and Alberta's school districts and boards are routinely attempting to understand how to best write the provisions in the various collective agreements concerning journeyperson experience for pay-grid purposes. Some districts and boards do not pay journeypersons for their trade experience if those teachers are teaching the Grade 10 courses that do not require journeyperson status as deemed by Alberta Learning. Some collective agreements have specific clauses outlining that each year of trade experience beyond journeyperson status will be evaluated at one year for pay-grid placement. Some are at two years' experience for every one year of pay-grid placement. Some simply have a policy that it is determined individually by the superintendent, which means that each teacher may be placed on the pay grid at different years of experience. This is usually the case when supply and demand issues come into play and the districts and boards begin competing for journeypersons/teachers. Some collective agreements do not recognize trade experience for grid placement of those multi-ticketed tradespersons, some do not recognize the years spent teaching the trade outside of the province of Alberta, and some do not recognize any past teaching experience in the trade if it was at college. These disparities can be confusing when journeypersons/teachers apply for automotive positions with the various districts and boards. Usually there is a clause that allows for the superintendent to review and offer the journeyperson/teacher a grid placement based on "trade wage parity" or supply and demand. Some districts and boards consult the journeyperson's previous employer to establish the number of years of experience to allocate to a newly hired journeyperson/ teacher. With automotive tradespersons in demand and industry wages being more or comparable to a beginning teacher's salary, it becomes hard for tradespersons to justify the financial investment of three to four years of university teacher training. The colleges have had greater success with instructors with exceptional current trade skills than with

noncurrent trade-experienced, university-teacher-trained journeypersons. The colleges find that they can also hire these non-teacher-trained journeypersons/teachers at a lower salary on their grid placement. It must be noted that a typical non-university trained college instructor is compensated greater than a beginning first-year teacher with no journeyperson status. These different disparities seem to compound the problem of fairly placing journeypersons/teachers on salary with consistency. These disparities have also placed the ATA in a precarious position when hearing complaints about CTS journeyperson grid placement.

Tables 7, 8, and 9 and Analyses

Table 7

What Is Your *Highest* Teacher-Student Ratio in CTS Automotives Specifically?

School no.	Ratio	Comments/explanation
1.	21:1	*No Response*
2.	24:1	*No Response*
3.	22:1	Streches [*Sic*] limits of facility.
4.	22:1	*No Response*
5.	21:1	*No Response*
6.	20:1	*No Response*
7.	23:1	Max. PTR should be 15:1 in auto shop courses.
8.	25:1	*No Response*
9.	25:1	22 Max for 11&12 12 Min " " "
10.	25:1	This is the maximum starting number in mechanics 10 classes we always lose a few during the semester.
11.	24:1	*No Response*
12.	21:1	During theory classes
13.	30:1	Only one or two Mec 10 classes most are smaller.
14.	32:1	*No Response*
15.	27:1	Mec. 10 is primarily classroom theory due to high enrollments.
16.	*No Response*	*No Response*
17.	24:1	*No Response*
18.	23:1	This was at the start of the semester. 4 students changed classes or moved so it ended up being 19.

(table continues)

School no.	Ratio	Comments/explanation
19.	24/25:1	We are on the quarter system and in the 3rd quarter of the 96/97 school year I taught 24 students at 4 different levels in the morning class and 25 students at 5 different levels in the afternoon class. Since this scenario, I have been guaranteed an average of 20 students per class but a combination of from 1 level/program to 6 or more levels/programs at a time. Alberta Learning ----- C.T.S. Program [*Sic*]
20.	*No Response*	This does not apply at my school because we operate on a 15 PL model.
21.	24:1	*No Response*
22.	24:1	*No Response*
23.	26:1	We have capped classes at 26
24.	32:1	Shop designed for 16 or 18:1.
25.	23:1	*No Response*
26.	25:1	*No Response*
27.	27:1	At beginning of year in intermediate course. Now about 19 to 1.
28.	26:1	18-20:1 After dropouts
29.	28:1	*No Response*
30.	22:1	Class have been as high as 26. Those classes were unmanageble [*Sic*] and were full of behavioral problems
31.	21:1	*No Response*
32.	20:1	*No Response*
33.	18:1	*No Response*
34.	27:1	The shop was originally designed for 18 students. There should be an official ratio of students/ sq.ft. Over crowding is hazardous. No one in charge will make a stand on student/teacher ratios or # of students per sqft. [*Sic*]
35.	30:1	Registered in second semester. I believe the number will be reduced to 26/28 students.
36.	24:1	Where possible-they load up to the hilt.

Table 8

What Is Your *Lowest* Teacher-Student Ratio in CTS Automotives Specifically?

School no.	Ratio	Comments/explanation
1.	15:1	*No Response*
2.	6:1	Senior class
3.	14:1	Heaven
4.	12-15:1	*No Response*
5.	15:1	*No Response*
6.	20:1	*No Response*
7.	11:1	*No Response*
8.	15:1	There have been exception [*Sic*] where the number was lowered to 12 or so.
9.	12:1	Lower & course is cancelled.
10.	8:1	This is the number of 30A/B students, but, they overlap with a mechanics 10 class and are almost all taking both Automotives A and B for 10 credits.
11.	16:1	*No Response*
12.	10:1	During shop classes with aid
13.	5:1	*No Response*
14.	18:1	*No Response*
15.	10:1	20/30 combined due to low numbers(this year only) – usually have = 16 20's and = 12 30's
16.	*No Response*	*No Response*
17.	6:1	Senior class
18.	10:1	There was some type of a timetable problem and students that normally would take automotives had other classes.
19.	17:1	This is still a multi-level class
20.	5:1	5:1 is for practical activities- Theory can be 20+
21.	16:1	*No Response*
22.	18:1	*No Response*

(table continues)

School no.	Ratio	Comments/explanation
23.	16:1	Some classes are run with as few as 6 students.
24.	19:1	*No Response*
25.	11:1	*No Response*
26.	14:1	*No Response*
27.	11:1	Current, was 17 to 1 originally.
28.	16:1	*No Response*
29.	19:1	*No Response*
30.	15:1	Usually for a Grade 12 10 credit course.
31.	10:1	*No Response*
32.	15:1	*No Response*
33.	12:1	*No Response*
34.	20:1	This is a more reasonable size of class to work with when you have 6 modules operating at the same time.
35.	20:1	*No Response*
36.	12:1	This will usually be a 30 level gr.12 course.

Table 9

What Is Your *Average* Teacher-Student Ratio in CTS Automotives Specifically?

School no.	Ratio	Comments/explanation
1.	18:1	*No Response*
2.	18:1	*No Response*
3.	20:1	*No Response*
4.	18:1	*No Response*
5.	20:1	*No Response*
6.	17:1	*No Response*
7.	18:1	*No Response*
8.	18:1	*No Response*
9.	20:1	*No Response*
10.	18.6:1	This is one Auto 30AB @ 8:1 one Mechanics 10 @ 20:1 Another Mechanics 10 @ 22:1 and an overlap of the Auto 30AB.
11.	20:1	*No Response*
12.	20:1	*No Response*
13.	18:1	*No Response*
14.	25:1	*No Response*
15.	25:1	10's
16.	*No Response*	*No Response*
17.	18:1	*No Response*
18.	16:1	*No Response*
19.	20:1	This was established in the 98/99 school year
20.	12:1	*No Response*
21.	16:1	*No Response*
22.	24:1	*No Response*
23.	20:1	After a month of classes we usually will have 18-22 students.

(table continues)

School no.	Ratio	Comments/explanation
25.	*No Response*	Should look at credit load. Over 50% of students/year try for 6 or 7 credits
26.	18-20:1	*No Response*
27.	20:1	*No Response*
28.	20:1	*No Response*
29.	22:1	*No Response*
30.	20:1	*No Response*
31.	17:1	*No Response*
32.	15:1	*No Response*
33.	16:1	*No Response*
34.	25:1	*No Response*
35.	24.5:1	*No Response*
36.	20:1	*No Response*

What is your *highest* teacher-student ratio in CTS automotives specifically?

What is your *lowest* teacher-student ratio in CTS automotives specifically?

What is your *average* teacher-student ratio in CTS automotives specifically?

The significance of these questions is to aid in understanding the current aspects of the student-teacher ratios in our province's automotive programs and provide feedback on the implications of these ratios and the program dynamics when establishing, lowering, or raising these ratios. There is no doubt that the student-teacher ratio plays a significant part in establishing a successful automotive program. Much of the analysis and research information provided on the topic of student-teacher ratios in Alberta's automotive programs can be used only as a guideline to assist other strands of the CTS curriculum, because virtually all of the CTS strands have different variables involved.

Based on the average student-teacher ratios of 24.5:1 reported by the participant-teacher surveys, with the low being 5:1 and the high being 32:1, the difference is important. Some automotive class sizes are only 15% the size of others. These schools

have determined these maximum and minimum student-teacher ratios in very different ways and for different reasons. Some schools only attempt to cap class sizes, and only when ratios are arbitrarily high, around 32:1, do administrators and counselors begin to stop adding students to classes. Some schools have attempted to run classes as high as 43:1. This should not happen, but the reality is that when a school cannot find a journeyperson/ teacher, the program is growing, and hiring a new teacher is in the works, it is regrettable to cancel half of the program enrollment for a semester.

School boards, the ATA, and school administrations should acknowledge the importance of student-teacher ratios in the equation for success in CTS. Many boards and school administrations as well as the ATA are seeking information on class sizes, although most of the information seems to be generic and even then is being applied to all strands of CTS or with little or no regard to specific schools programs or student requirements.

The analysis of Table 7 data will be further elaborated in conjunction with Tables 8 and 9, which all address the student-teacher ratios in the province's automotive programs. The information collected on student-teacher ratios has been separated into the following areas:

- Student safety: case law liability, Ontario's coroner report
- Equipment: adequate numbers
- Standard industry practice
- WCB standards
- Occupational Health and Safety
- Labor Board regulations
- Customer service repairs of public vehicles
- Vehicle storage
- Course scheduling
- Alberta College policies

- Successful Alberta high school approaches
- Unsuccessful Alberta high school approaches

Student Safety

After only one serious injury and a major civil litigation suit and the consequent stigmatization, it should be realized that the financial cost to litigate and pay damages would have been enough to run the program properly for many years. A shop environment has the potential for serious injury, especially when unsupervised work is taking place. Courts in the USA and Canada agree that the safety of our students is the foremost consideration after basic human rights. Ontario has begun a shift in policy on student-teacher ratios because of a death that took place in one of its automotive shops. The coroner's investigation has had an impact on the schools, because the report suggested that the safety in the school was less than would be expected in industry (Ontario Association of School Board Officials, 1998). The school was found liable for damages, and the coroner's report provided a list of industry-based recommendations that would assist the shops in becoming a safer place for students. In this list was the recommendation that each automotive class have no more than 20 students. The coroner recommended that the student-teacher ratio for each automotive shop be decided first by the size, then by the number of service bays, with three students sharing each bay, to a maximum of 20 students in the lab. The Labor Board of Alberta has also reported that the younger the worker is, the greater the risk of injury. It would seem that the younger worker has had fewer life experiences and therefore has less of an opportunity to recognize potential danger, or is of the belief that an accident cannot or will not happen to them. This is the primary reason that so many of the trades colleges in the US have now moved to a lower student-teacher ratio of 6:1 (National Automotive Technician Instruction Foundation, which is similar to the Canadian Apprenticeship Program). They have a class of 12 taught by two journeyperson-qualified teachers. These teachers also

have to be qualified in safety and first aid. With these extra safety measures in place, the colleges have found that the liability has shifted away from the colleges in recent law case studies. In Canada our colleges have an industry standard of 12:1. Again, there are two journeypersons/teachers for a class of 24 students. An important point raised by the colleges is that these adults learning the shop skills would have fewer accidents than our students who are less mature and have fewer life experiences with the possible dangers in a shop environment. Colleges in both Canada and the USA have agreed that the example of training safety that is taught and modeled during the education of the learner contributes to the learner's conception of acceptable workplace safety practices. The colleges further recommended that high schools promote the current and high level of safety, because not doing so often makes it often more difficult to correct unsafe practices in the future.

Equipment

Our shops have been neglected over the last few years and lack certain equipment. When students are working in the industry-standard group of three while training, they usually have a complete set of shop tools for each group. Examples of this would be NATEF colleges in the US and Canadian colleges teaching the pre-employment mechanic program. These programs teach a typical three-year high school program in 10 months. Actual instruction hours are similar to the high schools because students take classes for approximately five hours a day. These programs have more than one of each tool. Alberta high schools have very few instances in which we have more than one tool for a possible two of the current three classes per block that may be in the shop at the same time (50 students with two teachers). Even though it would be beneficial, the cost and maintenance involved in having a tool crib with these capabilities are beyond financial capabilities of most schools. Most of the colleges have tool crib attendants to administer and maintain the cribs. Many retired teachers stated that 10 to 20 years ago

there were many more tools, as well as many more schools with a person who cared for the tools, ordered parts, and built the teaching-display units, some of which still exist.

Alberta schools should begin purchasing the routinely needed tools, a minimum of six of each, allowing 18 students to work simultaneously. Other tools that are used less often could be purchased in lower quantities as is typically done today in colleges as well as in industry. Industry usually requires the technicians to purchase their own hand tools, and the employer is expected to purchase all others. Employers are concerned that their employees are nonproductive if they are waiting for a tool, and the shop foreman and/or the service manager will purchase a quantity of the specialty tools if there is productive time is lost because of an insufficient number of tools. Colleges have found that while each educational segment of a program is running the tool crib, the attendant can quickly determine how many of each tool is required. Adults in these programs generally will not tolerate nonproductive educational time spent waiting for tools, and as a result the colleges have sufficient numbers of each tool based on the requirements of the consistent student-teacher ratio and the tool requirements based on previous class demands. Employees in industry have the same concerns of the college students; an intolerance for delays during repairs due to lack of sufficient tool quantities. It must be noted that industry differs from the controlled situation at the colleges for determining sufficient tool quantities in that industrial concerns are routinely placed in situations where more specific tools are required at particular times. An example would be during the first cold days of winter, when most shops require greater numbers of tools for cold-weather start conditions that often plague many vehicles. The schools of Alberta could learn from the experience of both industry and colleges when attempting to properly equip a school automotive shop with sufficient quantities of tools. The underlying theme is that the student-teacher ratio, once established at a school, greatly aids in the teachers' ability to determine the quantities of the tools required to keep the students on task during the classroom labs or shop repairs.

Standard Industry Practice

Research of the automotive trade reflects some common reoccurring themes. One of these is the acceptance of "standard industry practice." One might expect to see a great deal of objective quantitative data on the automotive trade, but there is very little. There is even less quantitative data collected on the various aspects of the trade. Standard industry practice has been increasingly accepted by the trades people and industry to indicate the norms associated with virtually every aspect of automotives. Standard industry practices are ascertained by the examples provided through education and through the expected foreman and service manager shop practices. An example of this would be that a typical shop has exhaust hoses for the removal of harmful exhaust gases, one per every three bays. That would be standard industry practice, because not every bay will have engines running simultaneously. Some school shops possess more than one per bay. How many engines or vehicles could the shop's designer expect to have running simultaneously in each bay? Why might there be that many exhaust hoses? Industry's current tradespersons best understand standard industry practice, and this wasteful expense is a determent to Alberta's automotive programs when schools could have used the monies in other areas. The reason for standard industry practice is that the experienced tradesperson who has run engines using exhaust hoses can suggest what would best work in the shop.

The standard industry practice pertaining to student-teacher ratio varies. Below is a sample list of those ratios. More conclusive research data could not be found and probably does not exist in this area. This data was compiled from various industry sources and form the teacher perception surveys and is intended to convey the general industry practice of student teacher ratio.

High school automotive shops:

School A: 25:1 with a shop aide

School B: 40:1 with 2 teachers

School C: 12:1 with 1 teacher with the same equipment as larger shops.

School D: 15:1 with 1 teacher with the same equipment quantities as most schools.

School E: 20:1 with 1 teacher

School F: 80:1 with 2 teachers, 1 aide, and 40 computer stations with very elaborate software. Students in shop area only for practical. This method of delivery is still in its infancy.

Colleges and universities:

College A: 24:1 with 2 teachers, 2 aides, and 1 tool crib attendant

College B: 12:1 with 2 teachers, 1 aide, and 1 tool crib attendant

University industrial arts training: 15:1 with 1 teacher, 1 aide

College C: 18:1 with 2 teachers, 1 aide, 1 tool crib attendant

Workers' Compensation Board Standards

The WCB involves itself only with the safety of employees. Therefore it will conduct inspections to see if a working teacher may be at risk or in danger because of high student-teacher ratios. It will visit schools to determine whether any danger to a teacher exists when the student-teacher ratio is high or if the teacher is not a journeyperson technician with trade safety training. The WCB has no objective concerning student-teacher ratios, although it states that it inspects all kinds of unique workplace situations and would be able to assess the risk of acceptable student-teacher ratios or non-journeypersons/teachers in a shop environment. The WCB would not give any examples, as to ensure anonymity, but they did provide extensive information and policy-interpretation support for this research.

Occupational Health and Safety

Occupational Health and Safety (OH&S) will conduct an inspection at any high school in Alberta and will recommend any control measure that might aid in creating a safer environment. It is worth the time and expense to inspect and change. OH&S would also consider the ergonomic environment, which has more of an affect on long-term safety issues and long-term efficiency of the environment. The latter involves the use of first-aid kits, yellow painted caution areas, exits, and so on. Occupational Health and Safety indicated that they are concerned with the competency of the worker. They refer to the teacher's qualifications when dealing with specific trade safety and first aid. Recommendations and control measures could recommend the automotive staff to take a St. John's first aid course or the schools to repair low-candle-power lighting, dangerous stairs, and similar problem conditions. There are already recommendations for journeyperson certification, the number of bodies according to the size of the area, and teacher-student ratios for a safe environment. There is no policy that suggests students per square foot or the number of shop bays that may hold vehicles. These recommendations are based on an inspector's assessment of the conditions while the activities are taking place.

The individuals I have visited and with whom I have spoken would base control measures and recommendations to Alberta schools on the Workplace Safety Act and what is acceptable in industry practice. Like the WCB, OH&S views many different workplace environments and suggests ways to make them safer not only in a policy-driven format, but also in a broad format using the recommendations of the inspectors, who have expertise in the activity that routinely occurs in the workplace. It may appear that this as a lack of policy, but the variety of risks to individuals is too exhaustive to be itemized and then prioritized to give an accurate assessment of the possibility of injury.

Labor Board Regulations

This board uses the Labor Act to identify workers whose rights to work are being infringed upon. If stress is directly related to the workplace, then a possible danger exists. A safe environment must be created and maintained. The investigators of the board will investigate only abuses or breaches of the Act. When I spoke with the members of the Labor Board, they stated concern about the very high percentages of stress-related illness that takes place in the education field in general, in shops and classrooms. They further suggested that they would most likely send an investigator to any school where there was a high level of stress placed upon a teacher to verify whether the situation was acceptable under their Act. Some automotive teachers who have taken stress leave return to work and find changes made to the school's automotive program to help the returning teacher cope. High student-teacher ratios and shop working conditions have been mentioned most often as reasons for stress leaves. Working-condition stresses involved dealing with customers, handling money, ordering parts, advertising for repairs, and soliciting and scheduling customer-service work for students.

Customer Service Repairs of Road-Going Vehicles

The rationale for realistic student-teacher ratios is of concern when attempting to schedule meaningful customer repairs for students to learn and hone their skills. This is one of the main attractions of a high school program. The students in a typical high school shop get their first experience of identifying a customer's need for a skilled person. Students often for the first time in their educational journey, are given the opportunity to display their skills in an environment that rewards them with a sense of contributing to the community. The customer needs someone to diagnose, estimate, and confirm the cost of the repair and then complete the repair to the standards set by the teacher. This process closely models that of most service trades and is identical to what takes place every day in automotive repair shops. The students gain a feeling of relevance

in the automotive program and in the school when this takes place. When students are thanked and praised by the customers whose vehicles they have repaired, they begin to understand the importance of their work and a heightened sense of self-worth and self-satisfaction. Teachers from other subject areas often bring their vehicles in for students to repair. These teachers are viewed as contributing to the automotive program, and the teachers who have had their vehicles repaired suggest that the student-teacher relationship is now reversed and that the students acknowledges the teacher's gratefulness and appreciation of the skills and the service provided by them. This is usually the first time in the students' scholastic process that they realize that the skills and work ethic acquired in school are relevant and that appreciative customers will recommend them to other potential customers in the community.

Automotives is one of North America's largest industries, with approximately one of every seven jobs in the country related to or relying on the automotive industry. Alberta presently has a large shortage of skilled automotive technicians. The opportunity for schools to inspire students to become apprentices could not be more timely; it will provide large future dividends to the province's economy. Many of Alberta's schools have mission statements that suggest that these programs in school are the initial step in providing the skilled people of our communities and offering the student an opportunity for higher learning. The apprenticeship programs require inspired and skilled high school automotive students in large numbers at this time. The Apprenticeship Board of Alberta has designated a group of modules/courses that will give the student an opportunity to challenge the first-year apprenticeship exam and gain advanced standing in the requirements for becoming a journeyperson. Not all students will continue with the automotive trade after completing high school, but by recognizing the need for lifelong learning and the possibility of career changes, the high school automotive graduate will have relevant skills for gainful employment immediately following high school. Because

the automotive industry is so large, the opportunity for future advancement or related career moves in other aspects of the automotive industry would be realized.

Vehicle Storage

The number of vehicles required to keep the work groups in each class challenged with meaningful work soon becomes an integral part of the student-teacher ratio. To store vehicles waiting for parts, those dropped off by customers, those picked up by customers, and those that are long-term projects in the shop would keep school shop bays full and students would have to wait for empty bays before beginning work on their assigned vehicles. This is not allowed to occur in college-level automotive training because adult learners will not and should not tolerate this kind of inefficiency. Colleges set their student-teacher ratios and then ensure adequate storage of the vehicles while they are in for repairs. Both the high school and college automotive programs take into account that customer-service vehicles are going to be on site for considerably longer periods of time because automotive students may be taking other classes or their work is performed at a slower pace because of the educational aspects of learning and having the teacher inspect and grade the repair process. For these reasons, most schools have fenced outside storage called a compound. Some schools have not determined the extent of storage requirements because they have not determined the student-teacher ratio, the number of classes in a day, and the frequency of each student being in the shop because of timetabling issues.

These issues are sometimes a struggle in college automotive programs, though college-level programs prioritize them to guarantee that each student or the usual group of three students have a bay for the vehicle on which they are working. Some schools have compounds that often become junk storage. When this happens it deters from the automotive program in that possible valuable vehicle space is taken up. As well, the appearance of the compound sets a poor example for students and for customers and is detrimental to the program. Industry is very cognizant of good appearances, and well-run,

organized repair shops maintain the appearance of their compounds to ensure that they do not detract from their business. There are also obvious safety issues when compounds are used as junk storage. Many schools and colleges have suggested that there is no need for storing old used parts. The automotive wrecking businesses will usually take them and give credit to the schools and/or colleges for valuable components/assemblies, which the wreckers will then deliver.

The financial cost of compounds is minimal when compared to the alternative of leaving unattended school and customer vehicles in an open parking lot at night. Another contributing factor to adequate storage is decreasing the student-teacher ratio to allow vehicles to be left in service bays for the entirety of the repair. For example, in an automotive program having an 18:1 student-teacher ratio, if a class requires six vehicles for the 18 students while working in the shop, during five blocks and with two full-time teachers, the realistic total is 20 to 40 vehicles, depending on the school's timetabling method. Many schools have large compounds, and the teachers recognize their convenience and necessity.

Maintaining a compound in an orderly manner is important because few students have advanced driving skills required for vehicles with which they are unfamiliar. Few schools reported that the teachers were the sole drivers of vehicles that come into the shop or into the compound. Teachers reported that they are unavailable to move vehicles to the shop themselves because they are supervising the working students, which means that the students and customers will move vehicles in the compound or in the shop. Most schools have shop policies that allow only licensed drivers to do this, some do not. Orchestrating the sequence, placement and movement of these vehicles is an important consideration because, similar to the situation in industry, parts have to be ordered and delivered, which can take considerable time and the bays must be kept in continuous use for other classes as well.

Course Scheduling

A school with a maximum student-teacher ratio of 18:1 and with all of the students taking the same course would only further benefit from course scheduling that would allow these students to take the course for the entire morning each day of the semester for 10 to 12 modules, keeping the students in the shop focused and sharing with each other as they learn the modules together. Students would benefit by consistently following the accepted module flow chart that guarantees that if they take Grades 10, 11, and 12 classes, they qualify for the Articulation Apprenticeship Program and that they could challenge the first-year apprenticeship exam and receive hundreds of hours of advance standing. This is why many successful automotive programs have chosen a course flow chart similar to the one in Appendix D described as “Program Flow Chart”. Shop equipment and the module prerequisites have to be very carefully considered when choosing a flow chart that will best serve the student and allow the opportunity for possible future apprenticeship articulation. Many administrators also suggested that the flow chart determines how they dictate course bundling and assign students to the automotive programs and other CTS strands. Administrators suggested that an effective flow chart of bundled modules can assist them in determining future teaching assignments. This is a very positive aspect of expanding an automotive program, because both the automotive department and the school’s administration can anticipate the need for another automotive teacher and be proactive in the search for a qualified journeyperson/teacher.

Successful Alberta High School Approaches

It must be clearly understood that there is a lack of quantitative data relating to student-teacher ratios. This does not mean that these ratios are not important factors that contribute to the growth and decline of Alberta’s automotive programs. The data that has been gathered from this research are sufficient to reveal underlying themes with regard to

student-teacher ratios. Some schools have met with the automotive teachers in the shop and the classroom to discuss an appropriate student-teacher ratio. It becomes clear that any automotive program can support a student-teacher ratio based on the number of service bays, the number of tools on site, and the accepted industry practice for safe student numbers per teacher. An example of this would be that a program has a large shop and classroom but has no compound vehicle storage. Therefore, given the timetable, the teacher and administration would have to set the student-teacher ratio at 15:1. Once the storage issue is addressed, then the student-teacher ratio can be raised to 20:1, the maximum for one teacher.

Some teachers commented on the administration's acceptance of shop size as the only pertinent factor in determining an automotive program's student-teacher ratio. Other schools have brought in specialists or the district's CTS coordinator to help establish an acceptable student-teacher ratio. The more organized programs have two teachers with larger groups, because one of the teachers can then deal with customers and scheduling work and parts, and the other is able to assist students with their shop work. Having two teachers basically allows one teacher to oversee the working students at all times. An example would be that when one teacher is test-driving a vehicle, students are not left unattended.

Unsuccessful Alberta High School Approaches

Some schools suggested that each teacher be responsible for approximately 28 students in each class, so the student-teacher ratio for the shop has to be 28:1. This administrative decision will eventually send the program into a decline. Some schools have capped classes at 20:1, but often these are mixed classes consisting of several grades. Such conditions exist because councilors view only the one grade per period on the computer screen at a time, each of the grade levels has 20 or fewer students. The outcome is that the particular class may have 20 Grade 10 students, 15 Grade 11 students,

5 Grade 12 students, and 4 IOP students (It must be noted that Integrated Occupational Plan students are not normally eligible for CTS because of regulations regarding prior knowledge and skills). These schools have experienced major decline and staff dissatisfaction.

Table 10 and Analysis

Table 10

Does Your CTS Automotives Program Have an Aide?

School no.	Response	Comments/explanation
1.	Yes	Aid [*Sic*] is split between two shops plus other CTS courses.
2.	Yes	*No Response*
3.	No	Occasionally we have drop-in aides supplied by special needs are to help funded students.
4.	Yes	We employ a full time aid. Recently a 20 year journeyman with GM technical experience & managerial experience joined us. [*Sic*]
5.	No	*No Response*
6.	No	*No Response*
7.	No	Desperately need one since I am teaching 7/8 without a prep for 20 weeks.
8.	Yes	*No Response*
9.	No	We had aides and have been more trouble than they are worth.
10.	No	No, but it would increase ease and safety if we had one.
11.	No	*No Response*
12.	Yes	For three and a half days per week
13.	Yes	Shared with three instructors in four shops.
14.	No	*No Response*
15.	Yes	Just for this semester- no 20/30's last semester = no aide.
16.	Yes	*No Response*
17.	Yes	*No Response*
18.	No	*No Response*
19.	Yes	My Aid [*Sic*] is excellent. He is a qualified Journeymen (and would make an excellent teacher) But can't afford the B.Ed. training.

(table continues)

School no.	Response	Comments/explanation
20.	Yes	I have an Aid [*Sic*] ½ time He works with students on practical activities.
21.	Yes	*No Response*
22.	No	Class sizes would likely increase if an aid [*Sic*] was available
23.	Yes	Full time technician.
24.	No	I wish we could get one – very hectic pace (and stressful)
25.	Yes	Journeyman
26.	No	*No Response*
27.	Yes	*No Response*
28.	No	1 teacher gets program needs time in lieu of an aid [*Sic*] 0.1FTE.
29.	No	*No Response*
30.	No	*No Response*
31.	No	*No Response*
32.	No	*No Response*
33.	Yes	*No Response*
34.	No	There is money to blow on exotic P.D. trips, dept heads, lunches, admin. Etc. but insufficient funds for the classroom. Some administrators have too much power and will not take advice from the teaching staff.
35.	No	*No Response*
36.	No	Never has – not in 20 years since been at this school. [*Sic*]

Does your CTS automotives program have an aide?

The significance of this question is to ascertain the important aspects involved when an aide is introduced into the automotives program. A journeyperson shop aide provides a viable way for schools to grow their automotive program to an acceptable size and to then be able to hire another journeyperson/teacher. Of the teacher respondents, 44% of the schools indicated that they had an aide in their program. Some of the respondents indicated that the aide did not work full time in the automotive program.

Having an aide who is skillful and possesses a sound work ethic is very important. The aide must also be able to work with the journeyperson/teacher. It is also beneficial to have the journeyperson/aide possess different automotive specialty skills than the journeyperson/teacher. To create a harmonious work environment, it is vital to have the journeyperson/teacher as the primary person in the selection committee or simply, as some schools have done, leave the shop hiring to the shop. Respondent 9 indicated that the shop aides have been more trouble than they are worth. This is usually the result when the aides are supporting other strands and possess a journeyperson ticket in a strand other than the automotive strand. It is imperative that the aide possess journeyperson qualifications in the automotive trade. The aide would effectively contribute to the school's budget because of the extra students that could be placed in each class to justify the expense and still maintain the vision of contributing to the growth of the automotive program.

Respondent 24 commented that school's program is stressful and hectic and that an aide would ease the situation. A student-teacher ratio of 16:1 is the average financial break-even point for CTS funding. Given this information, it is then realistic to consider an aide's wage as being approximately equivalent to eight extra students in each class. This would then mean that classes would be required to be capped at 24 students if the classroom, vehicle storage, shop, and shop equipment could support a number of 24 students per class. What schools quickly realize is the increased efficiency of the program. Students are never left alone in the shop when the teacher is test driving a vehicle or is taking a washroom break. The school's equipment is better maintained with an aide's support. It must also be pointed out that an aide works usually 35 to 37 hours per week, which is greater than the time that students are present, and can greatly assist the teacher with administrative duties, and equipment maintenance.

Table 11 and Analysis

Table 11

What Percentage of Your CTS Classes Require You to Teach Two or More Modules/Courses Simultaneously?

School no.	Percentage	Comments/explanation
1.	100	*No Response*
2.	10	Mechanics
3.	100	Modularization has allowed admin and counciling [*Sic*]to time table very creative. But also allows for any student to show his potential or lack of it.
4.	50	Due to the number of students using our 6 bay shop in a typical day (approx. 60) shop space is limited. Therefore, we must orchestrate students into modules which are "floor-type" and "bench-type" in order to accommodate the number of students & projects. We also split modules into different sections in order to achieve this as the modules allow.
5.	0	*No Response*
6.	100	*No Response*
7.	100	The grade 11 &12 students are always put together, ie Intermediate and Advanced mixed.
8.	10	*No Response*
9.	100	*No Response*
10.	100	I like to have students doing theory and practical (shop work) related to eachother [*Sic*], therefor each group can often be working on a different module.
11.	100	*No Response*
12.	100	All shop classes require multiple group projects
13.	25	*No Response*
14.	None	I teach one module at a time
15.	100	Can't have discrete components – too much inter-relation in areas.

(table continues)

School no.	Percentage	Comments/explanation
16.	70	*No Response*
17.	30	-Automotives -Kids may have already taken the course being offered so the teacher has to modify their modules
18.	100	This is the flow with CTS. All the students should be taking the same course at the same time.
19.	5 out of 7	98/99 school year 100% multi-level 99/2000 5 out of 7 classes are multi-level
20.	None	Before our school changed to 15 SPL I would teach 10 modules simultaneously. – "Impossible" but that's CTS
21.	0	*No Response*
22.	50	Some students in the introductory CTS courses have already completed the intro courses. Often in the Intermediate level I allow students to work on extra credits/modules
23.	100	That many students we will have course overlap. Some finish early.
24.	7/8	Each class is set up that way.
25.	All	*No Response*
26.	0	*No Response*
27.	25	*No Response*
28.	20	*No Response*
29.	0	*No Response*
30.	0	I teach in a lock-step process. We finish 1 module then move on. Those finishing early do customer service work.
31.	0	*No Response*
32.	0	*No Response*
33.	--	In the shop, students maybe working on 5-6 different modules. In theory, only 1 module is taught at a time!
34.	100	I am teaching six modules simultaneously. We have done this even before CTS.
35.	0	*No Response*
36.	*No Response*	We dealt with the difficulty of this when CTS was introduced- but we now have moved to maybe having mixed grade 12 ONLY.

What percentage of your CTS classes require you to teach two or more modules/course simultaneously?

This question illustrates to the reader the issues surrounding the aspects of attempting to teach two or more of the CTS courses simultaneously. Some boards are in the stage of writing policy for CTS courses to address this issue. However, such policy is in its infancy and is very broad. One board's draft policy attempts to cover all the CTS strands. It seems that many of the strands have unique circumstances or class/shop/lab dynamics, and one blanket policy on teaching multiple courses simultaneously would not be feasible.

Alberta colleges' automotive programs have experimented with competency-based modular formats, mastery learning blocks, and Dacum units in the past. Their trials in the automotive programs should be an indicator to the high school automotive programs that these experimental programs or experimental deliveries of instruction have only had small portions of their methodologies borrowed from to enhance the curriculum which the colleges presently offer. The present college curriculum should be used as a model for the high schools, because these experimental programs and different deliveries of instruction have been tested. The colleges' automotive programs teach only one concept at a time, because attempts to teach more than one have failed in every trial. Using audiovisual equipment if not all students are on that same concept leads to distraction. The same is true of interactive board-work theory lessons. Classroom labs are also a reason that simultaneously teaching multiple concepts does not lend itself to automotives, because the noise of dismantling a lab assembly while other students are attempting to study other concepts is disruptive. The colleges have found that to learn the concepts takes time, and the more time that students spend on different concepts simultaneously, the greater the pressure for the instructors to have the class complete the programs on time. College instructors quickly realize, as do high school teachers, that they have to shorten the time allotted for specific learning of the concepts to cover the

concepts more than once per program. An example of this would be having half of the class learning a Shakespeare play while the other half are working with the teacher on learning a mathematical geometry concept. The teacher and students in the class know that in time they will have to learn what the other is doing, and their curiosity and distraction interfere with the learning of each concept. Some of the initial plans for the new CTS curriculum were to have every student working on a different module/course simultaneously, but no automotive program has been able to do this successfully. Virtually all teachers of the Alberta high school automotive programs are still teaching one concept at a time to the entire class. A few are attempting to teach two, with the result that now they simply cram two lessons/labs/shop work into the time allotted. This hectic schedule and the disruptions from each group hinder the learning of the concepts. The intention of the new CTS was to benefit schools so that schools that do not possess sufficient shop equipment could have students on task in the shops working on different projects. The college and high school teachers understand that they are not going to purchase eight wheel-alignment machines or eight engine-boring stations for one class of 24 students because of the prohibitive cost. To compensate, instructors, design related shop work or solicit customer service work as necessary until the wheel-alignment equipment is available for the next group of students. Teaching concepts simultaneously has a further disadvantage for the automotive shop environment. Some of the larger demonstration units of the various shop practical labs such as transmissions, can take up many bays for long duration as students work on them. The logistics of attempting to arrange the movement of these demonstration pieces from storage would require moving and scheduling every day as compared with the easier process of moving all of the transmissions at once when all students are completing the transmission course. The alternative would require one transmission when a particular student asked for it, then one engine for another and one differential assembly for another. The teacher would be duplicating shop teaching-demonstrations on these pieces of equipment, which is very

stressful. The acceptable method is to have all groups of students working on their transmissions simultaneously, and as the critical points of the relevant concepts become apparent, the teacher would gather everyone around one transmission for a single demonstration. Another reason for this method is extraneous noise would be eliminated because all students would be taking part in the shop demo. Time would be wasted in getting all the other students who are doing other noisy shop work to pause for a while so that only a few students can focus on the teacher. Doing so for lengthy shop demos is counter productive in a shop environment. This is usually the outcome when students attempt to learn different modules simultaneously. Respondents 10, 18, 20, and 36 commented on the efficiency of teaching one course at a time, because attempting to teach more than one involves complicated dynamics.

Some CTS strands do not require that all students learn one concept at a time. The nature of this study is to research the underlying themes in the high school automotive programs in Alberta. One example of where students can work on many different courses simultaneously and have class sizes of 50 or more is in the computer programming subject area. Here teachers have indicated to me that they simply move around the room, answering questions, while competency-based and self-directed learning takes place at each individual terminal. These teachers have emphasized that more terminals could support an even higher student-teacher ratio. It becomes clear that there are unique aspects of each strand of CTS that must be taken into consideration. Boards, districts, school administrations, and teachers must understand that if optimum student outcomes are to be accomplished, the teacher's time must be utilized as efficiently as possible. This means that the teacher should not be overwhelmed with having to deliver too many of the same lengthy demonstrations. These lengthy demonstrations also delay the other students who are at different points in the course if they are asked to halt all noisy shop work while the teacher repeats another shop demonstration. Classroom instruction is only marginally better because many of the automotive courses incorporate classroom labs or

class demos, and the teacher must repeat the same lessons to a small number of students as they reach those points in the course. This is not an efficient method of delivering the course material.

Table 12 and Analysis

Table 12

How Many Shop Bays Does Your Auto Shop Have?

School no.	Number	Comments/explanation
1.	5	*No Response*
2.	15	Without blocking access
3.	4 Doors	On any given day 5-9 cars Two bays dedicated to hoists rest of shop wide open and mobile.
4.	6	6 individual bays & a center area (about 2 bays). Problem if center bays are used shop congestion is an issue.
5.	12	*No Response*
6.	14	*No Response*
7.	20 Max.	In two shops depending upon shop set up configuration.
8.	15	This makes the shop tight & undersized if enrollment is forced up too high – as a result I have purposely limited sections opened – we have had years of close to 200 students – almost unmanageable to find activity space.
9.	22	Two shops.
10.	19	Eight in the junior shop. 4 with hoists. Eleven in the senior shop. Seven with hoists. [*Sic*]
11.	14	This is one (little one) of 3 shops.
12.	6	2 Doors- I have had as many as 9 in the shop at one time
13.	5	*No Response*
14.	8	*No Response*
15.	10	*No Response*
16.	21	*No Response*
17.	15	-Any more becomes an unsafe working environment.
18.	16	We are very crowded. Benches that were used previously have been moved outside.
19.	7	1-Wash Bay, 2 Hoists, 4 Floor Stalls

(table continues)

School no.	Number	Comments/explanation
20.	3	*No Response*
21.	6	*No Response*
22.	8	5 set up for larger projects 3 set up as service bays
23.	12	6 Senior 6 Junior
24.	11	2 shop labs- 1 lab 4 bays- 2nd lab 7 bays
25.	All	Someone in the shop every day after semester introduction.
26.	10	*No Response*
27.	20	*No Response*
28.	8	*No Response*
29.	4	*No Response*
30.	10/shop	We have two shops. 10 bays in one shop 12 bays in the other shop.
31.	4	*No Response*
32.	6	*No Response*
33.	6	*No Response*
34.	5	There are 4 spaces for cars and one hoist.
35.	11	*No Response*
36.	2	*No Response*

How many shop bays does your auto shop have?

The significance of this question is that it explores one of the most important factors relating to student-teacher ratios for automotive programs, and it also has an effect on the customer-service component. While administering the initial pilot study of post secondary institutions it was noted that Alberta colleges have spent time controlling the variables in field-testing shop group numbers. They have consistently found that groups of two or three work the best. A group of three is preferred, because it still allows the three students interaction during the dismantling and assembling of shop projects. It seems that four or more in a group increase the chances of one or more students

becoming an observer rather than a participant in the repair. The colleges of Alberta have therefore decided that if a class with a student-teacher ratio of 12:1 requires four bays for an adequate shop environment, and if there are two teachers, the 24 total students should have at least eight bays so that the 24 students can be divided into groups of three. If other classes are also using the shop, then an outside storage area is required for the vehicles to make room for the other classes' project vehicles.

The logistics of providing vehicle space in Alberta high schools is problematic, because there are usually one or more factors that prevent a smooth-running schedule for students and for the customer service work required as part of the practical aspects of their education. Some shops are too small, and the students have to be placed in groups greater than three; the chances of every student in the group contributing are therefore slim. Some schools shops are used four periods a day, which means that in each class, moving vehicles consumes a large portion of the shop time. Some schools do not have adequate outside storage, and customer service vehicles waiting in shop bays for parts are taking up valuable shop space needed by other students classes to work in that shop bay. Some schools have shops with inefficient floor plans; for example, those with only four entrance doors for a 36-bay shop, three entrance doors for a 27-bay shop, or one entrance door for a 15-bay shop with the only hoist directly in front of the door. Awkwardly laid out floor plans contribute to the failure of a program and can present dangerous situations. One of the most serious possibilities of injuries involving automotive retail shops or school shops occurs in the movement of vehicles around in the shop or moving vehicles to outside locations (Refer to respondents 2, 4, 12, 17, 18). Students' lack of driving skills present a danger when they maneuver vehicles in these very tight areas. In addition, their unfamiliarity with different types and sizes of vehicles increases the possibility for injury. Workers' Compensation has alarming statistics indicating injury by students' attempting to model the skills of an experienced person in the work place. The commercial industry has clear safety measures for large moving equipment or vehicles in

confined spaces. These are clearly marked caution movement areas, movement sirens and blue movement beacons, floor-mounted safety posts for worker protection, and training in the proper procedures of moving and guiding large equipment in confined spaces. With the accidental death of an automotive shop student in Ontario, it was noted in the coroner's report that the youths in school had less safety training and fewer safety practices were observed in the shop than would have been expected in an industrial setting. The Ontario accident and the coroner's report have resulted in Ontario's schools putting in place safety procures identified as safe practices when moving large equipment in confined spaces (Ontario Association of School Board Officials, 1998).

Some respondents noted the number of hoists that their shops possess and the access to them. Alberta's high schools differ greatly in this area, because the 11 hoists reported by respondent 10 are 11 more than many other schools have.

The underlying theme is that even the largest school shops become crowded and possibly dangerous when three, four, or even five different classes are using the shop each day and have to move vehicles around to clear a work bay for their project. Some school's administrations have established a maximum number of student-teacher ratios as determined by the number of bays in the shop. This has proven to be beneficial for the students, the teacher, and the program. However, the credits generated are lower than usual in most shops of a comparable number of service bays, as in, for example, 12 students for a small shop of five bays. Some other boards and districts are writing policy on shop size as it relates to student-teacher ratio. There is no doubt that the class dynamics and the safety of students and teachers change when a school's number of service bays, the number of classes that use the shop daily, and the student-teacher ratio are taken into consideration.

Tables 13 and 14 and Analyses

Table 13

How Would You Rate the General Condition of the Shop Equipment Your Auto Program Has?

School no.	Excellent/ average/ poor	Comments/explanation
1.	AP	Equipment has been around for over 20 years.
2.	A	Maintenance and upgrading are a continual problem
3.	A	*No Response*
4.	E	Our shop was set up in '93 and our budget team is very supportive of maintaining & updating equipment.
5.	A	*No Response*
6.	AP	Lack of funding for update
7.	P	School has not had any funding for upgrades to facility or equipment in over 20 years.
8.	A	*No Response*
9.	P	CTS money does not come to school!!! NO MONEY for repair let allown replacement or upgrades. [*Sic*]
		Note All of the old tech. Grant money went to general rev.
10.	EA	*No Response*
11.	P	Lack of funding has stopped us from updating our equipment
12.	AP	Many pieces are very old.
13.	E	*No Response*
14.	A	*No Response*
15.	EA	*No Response*
16.	AP	*No Response*
17.	A	Maintaining and upgrading, Purchasing of new software is a continous problem. [*Sic*]
18.	AP	A lot of the equipment is rather old but still functional.

(table continues)

School no.	Excellent/ average/ poor	Comments/explanation
19.	EA	The school was opened 09/84 We are receiving 2 new hoists (Mar 15) A considerable amount of time and effort is spent on equipment maintenance and repair.
20.	EA	I have excellent support from school admin. They let me make appropriate decisions
21.	A	*No Response*
22.	A	*No Response*
23.	EA	The teachers make sure equip. is kept up & updated.
24.	AP	Old equipment; in a relatively poor state of repair- Some equipment not used due to disrepair and no money to fix.
25.	EA	needs a few up grades to computer & Antilock Braking to be excellent [*Sic*]
26.	EA	*No Response*
27.	AP	Getting better, virtually all equip was not functioning Jan 99 but we have nearly everything working now.
28.	E	This school is 16 years old.
29.	A	*No Response*
30.	A	We are starting to upgrade our equipment but is a slow process. We can usually afford 1 major purchase (max $5000.00) / year.
31.	P	*No Response*
32.	A	*No Response*
33.	AP	The Shop/program has been in operation for 18 years. The Alberta government needs to have a funding/evergreening program in place! **Now! When?** [*Sic*]
34.	A	Most of the equipment was second hand and had to be scrounged over the years
35.	A	*No Response*
36.	AP	we did get some help when BQRP was in but not since. [*Sic*]

Table 14

<u>**How Would You Rate the Amount of Equipment Your School Has to Deliver Your Program?**</u>

School no.	Excellent/ average/ poor	Comments/explanation
1.	A	Upgrading of equipment to keep up with technology
2.	AP	Some of the equipment used to diagnose and repair is obsolete or non existant [*Sic*]
3.	A	*No Response*
4.	E	*No Response*
5.	A	*No Response*
6.	AP	*No Response*
7.	P	Same as Above. [*Last question #13*]School has not had any funding for upgrades to facility or equipment in over 20 years.
8.	A	*No Response*
9.	P	NO MONEY!!! School board keeps all of CTS money that school makes & splits it up for all schools. Note All of the old tech. Grant money went to general rev. [*Sic*]
10.	EA	*No Response*
11.	A	*No Response*
12.	A	*No Response*
13.	E	*No Response*
14.	A	*No Response*
15.	EA	*No Response*
16.	A	*No Response*
17.	AP	Software cartridges are 3-4 yrs old -- so are already obsolete – Import card for scanner non existent – makes Diagnosis & Repair On Imports difficult [*Sic*]

(table continues)

School no.	Excellent/ average/ poor	Comments/explanation
18.	A	Some modernization was done last year. This included a scanner and a DIS compatible scope.
19.	E	Excellent now with the Mar 15/2000 installation of a 4 post "Alignment Ready" Hoist
20.	E	*No Response*
21.	A	*No Response*
22.	A	*No Response*
23.	EA	Very good compared to Public Board.
24.	AP	Average to poor. Barely enough of the basic tools - no extensive diagnostic/specialty tools.
25.	E	*No Response*
26.	EA	*No Response*
27.	EA	Need some modern items yet such and scanner etc [*Sic*]
28.	E	*No Response*
29.	P	*No Response*
30.	A	*No Response*
31.	P	*No Response*
32.	A	*No Response*
33.	EA	*No Response*
34.	A	As far as I know without visiting other schools. There are no standards as far as I know. Is there any equipment list for each module?
35.	A	*No Response*
36.	A	*No Response*

How would you rate the general condition of the shop equipment your auto program has?

How would you rate the amount of equipment your school has to deliver your program?

The significance of these questions is evident in the respondents' selections and comments. They may give the reader an overall understanding of the numbers of equipment, the condition of the equipment in the schools, and the implications to consider when attempting to encourage an automotive program. Most of the equipment is in poor condition, with most of the respondents indicating that that it falls into the *average to poor* rating, the second lowest. The comments substantiate this by the following examples: "Lack of funding has stopped us from updating our equipment" and "School has not had any funding for upgrades to facility or equipment in over 20 years." With the CTS funding being higher than that for the academic courses for each credit earned by students, there should not be much problem in upgrading the equipment. Below is a typical financial breakdown for an automotive shop that has two teachers with full-time assignments for the year:

School revenue for each credit	$118.00
Students in average-size class	X 12
Classes in which two teachers will provide instruction	X 12
Credits that could be earned by each student	X 12
TOTAL =	$203,904.00

Academic and CTS credits are each worth approximately $118.00 to the school. Funding appears to be adequate, although the costs of administrators and support staff require the greatest portion of the shop's example income. It must be noted that schools' budgets mirror the district budgets in that they spend 80% to 85% of the total income on salaries and benefits to the teachers, administrators, and support staff. Most districts report an average estimated cost of $57,000.00 per teacher per year for salary and benefits.

In the early 1960s the Technical and Vocational Training Assistance Act (TVTA) was responsible for many of the new vocational shops being built and equipped with tools. It must have been gratifying for automotive shop teachers to witness new vocational trade schools being built and orders for shop equipment in the millions of dollars. Much of the equipment purchased then is still in our schools. Some respondents suggested that very little has been spent since this time. Respondents 1 and 7 spoke about schools possessing the original equipment provided for by the TVTA. Many newer vehicles require special tools and extensive knowledge to repair them, and in schools without these tools or knowledge, these newer vehicles are not repaired.

Schools that cannot afford these specialty tools can borrow them from after-market parts suppliers. Because many schools and smaller commercial shops do not possess these tools, the parts suppliers have acknowledged that this is a very good method for the automotive industry to be supplied with these specialty tools which are infrequently required, and there is no need for every shop to purchase them. Many schools and small commercial shops have benefited greatly from tool loan programs. Some boards or districts do not allow the automotive teachers to purchase parts from these certain suppliers, therefore, schools can take advantage of these tool loan programs. Some boards and districts allow the automotive shop teacher to purchase from one supplier only, which creates a very different situation if the supplier does not participate in a tool loaner program. Schools also take advantage of certain parts-supply programs for picking up parts from businesses that do not deliver. Examples of these would be specialty parts stores and auto-wreckers. Schools can also take advantage of parts suppliers' mechanic-training sessions. In such cases parts suppliers will send out an instructor to the school with the latest equipment to train and demonstrate the equipment. These are usually tremendous opportunities for the schools, because the training sessions are designed for industry and are short and efficient. Some parts suppliers will also invite the teacher and some or all of the automotive shop students to their trade shows, where

the large manufacturers of parts, accessories, and vehicles have impressive displays of leading-edge technology and products. The restrictions placed on some automotive shops in liaising with parts suppliers can affect an automotive school program drastically.

It must be pointed out that the schools and the commercial shops are under no obligation to buy parts or to pay a higher price for parts because of these extra services that some parts suppliers offer. Most parts suppliers will do extra work for the schools, as they are automotive industry people who have usually gone through an automotive program in the past and feel that they can contribute in a positive way to the schools. The boards and districts that restrict schools from purchasing supplies and parts from these generous businesses are often not aware of the whole picture. Some of these boards and districts have suggested that the major reason for the use of one parts supplier is that is simplifies the district's paperwork in paying for the parts and supplies that the school's automotive shop uses. It is also been suggested that schools purchase as few supplies and parts as possible for automotive customer service shops because of the extra paperwork for the purchasing department compared to that for an academic course in the same school. Some boards and districts have further suggested that the automotive programs use shop vehicles and not do customer service because of the extra paperwork for the purchasing department.

Teachers and students in schools' automotive shops require knowledge of the vehicle to accurately repair it. In the past many of the dealerships would give schools their older manuals or duplicates of newer manuals, and in recent years much of the automotive repair literature has been on disc. Shops are less likely to give these away because they do not take up the physical space required by the old book-style manuals. There are automotive literature suppliers for all the data required for schools and commercial businesses. Such suppliers will supply and make quarterly updates available to those who have purchased their online manual system. These are truly good systems for Alberta's automotive programs because they represent the current industry practice as

well as providing a practical application for the student to acquire and use valuable computer skills. These new online manual systems also have web-ready links to the manufacturers' web sites for specific problem cases of manufacture factory recalls and so on. Some schools have embraced these great online systems, and others have yet to implement this aspect of vehicle service data in their programs. However, some of these online manual systems are flawed in that they occasionally do not have the required information or there are software problems, and mechanics in industry would prefer to work with a manual again if they had a choice. It must also be remembered that these online manuals are updated quarterly to remedy the initial bugs, and future versions of the programs will most likely be more complete and accurate. Mechanics as well as students occasionally find mistakes and/or missing information in the book-style manuals. Students appreciate the ability to print out only the few pages of the data they require for the repair rather than attempting to "not get the only shop manual dirty." Without the online-manual system the teacher would usually have to leave the shop area to photocopy the relevant pages to avoid dirtying or damaging the manual while it is on the bench where the repair is being made. These online-manual software programs often have client-tracking aspects, tool and parts inventory capabilities, and usually a cost-estimating guide for determining the average length of a repair and the costs involved. This is beneficial to students for use during a customer service repair because the printout clearly shows the customer the savings to them because virtually all schools do not charge for the labor portion of the repair. Some of these programs also have a feature which automatically itemizes the parts required for the chosen repair and directly emails to parts suppliers who are online. This feature is very efficient because one forgotten part may not be noticed until it is required in the assembly process. Few schools have delivery of parts from the suppliers within that class period, resulting in lost class time.

Some commercial and industrial establishments have begun to install a screen above the mechanic's bench that allows the mechanic to access these service data and use

real-time video for playback if assistance is required with the assembly stage of the repair. These videos have also been used to document recall repairs. The screens are motion sensitive, and the mechanic's dirty hands need never touch the computer hardware. It must be pointed out that administrators, boards, and districts offering the automotive programs usually are not aware of these new shop-industry procedures and their advantages in growing an automotive program. The automotive teacher must be knowledgeable about future shop-tool procurement and tool-loan strategies to better prepare students for the reality of whatever industry, regardless of whether it is automotives, will employ them. This positive support is conveyed by respondent 20's comments: "I have excellent support from school admin. They let me make the appropriate decisions."

The school's hand tools make a particular uniquely contribution to the working of an efficient shop. This is particularly evident when customer service repairs are involved. With the great numbers of hand tools required in a shop, they must be efficiently organized to avoid lost time with shop projects in finding and returning these tools and being accountable for missing tools at the end of each class. This is beneficial if a hand tool has been accidentally left in a customer's vehicle, as well as to discourage theft of the tools. Some schools report alarming numbers of tool theft each year (although others have had virtually none), because some schools provide keys that open the tool crib storage areas to everyone in the school, and because students are often allowed in the shop areas unsupervised. Some schools have begun to organize their tool cribs properly by using angled tool boards that have a surface-mounted ¾-inch plywood cover with cutout shapes fitting each tool exactly. This has had positive results and virtually eliminates the possibility of placing a tool in an incorrect space. It also allows the teacher or appointed tool crib student to quickly scan the tool crib for missing tools at the end of each class. Many of the schools in the province could benefit their program by simply adopting this proven method of tool crib organization.

Part and tool inventories at some schools do not exist. Some schools do routine inventory, and it is these schools that have little or no theft. It is evident that the school's parts and tool crib should be keyed differently from the rest of the shop, the CTS wing of the school, or the entire school. Schools report a dramatic drop in theft of parts and tools when only the automotive shop teachers possess a key. Some schools may want to lock and unlock the cribs following a proven industry method in which a programmable push code lock has been installed. This is a mundane task that would save valuable time for the teachers, some of whom reported that they have to lock and unlock one or more doors up to 30 times a day. The programmable lock code can be changed as required, and a master key will override a forgotten code or a mistakenly programmed code. To become efficient, industry has had to deal with similar issues and implement procedures that solve these problems.

The new CTS curriculum allows schools' automotive programs to choose the courses that can best be delivered with the tools and equipment available. However, many teachers and administrations may be unaware of this policy. An automotive flow chart (see Figure 1) helps to determine the path of learning for students and to choose courses that best represent the individual school's ability to succeed with the program. A matching checklist can be made of the school's tool and equipment inventory and Alberta Learning's list of equipment that is required for each of the course in the automotive strand. It may be easier to get advice from the apprenticeship and Alberta Learning as to what courses work the best and in what order to deliver them, because if the school is going to participate in the articulation program, a particular group of courses must be taken by students. The apprenticeship board also stipulates that a journeyperson/teacher must teach most of these courses. The articulation form, which allows the student to challenge the exams and possibly gain advance standing in the program, must be signed by the journeyperson/teacher, and the teacher's journeyperson number must accompany the signature.

[illegible]

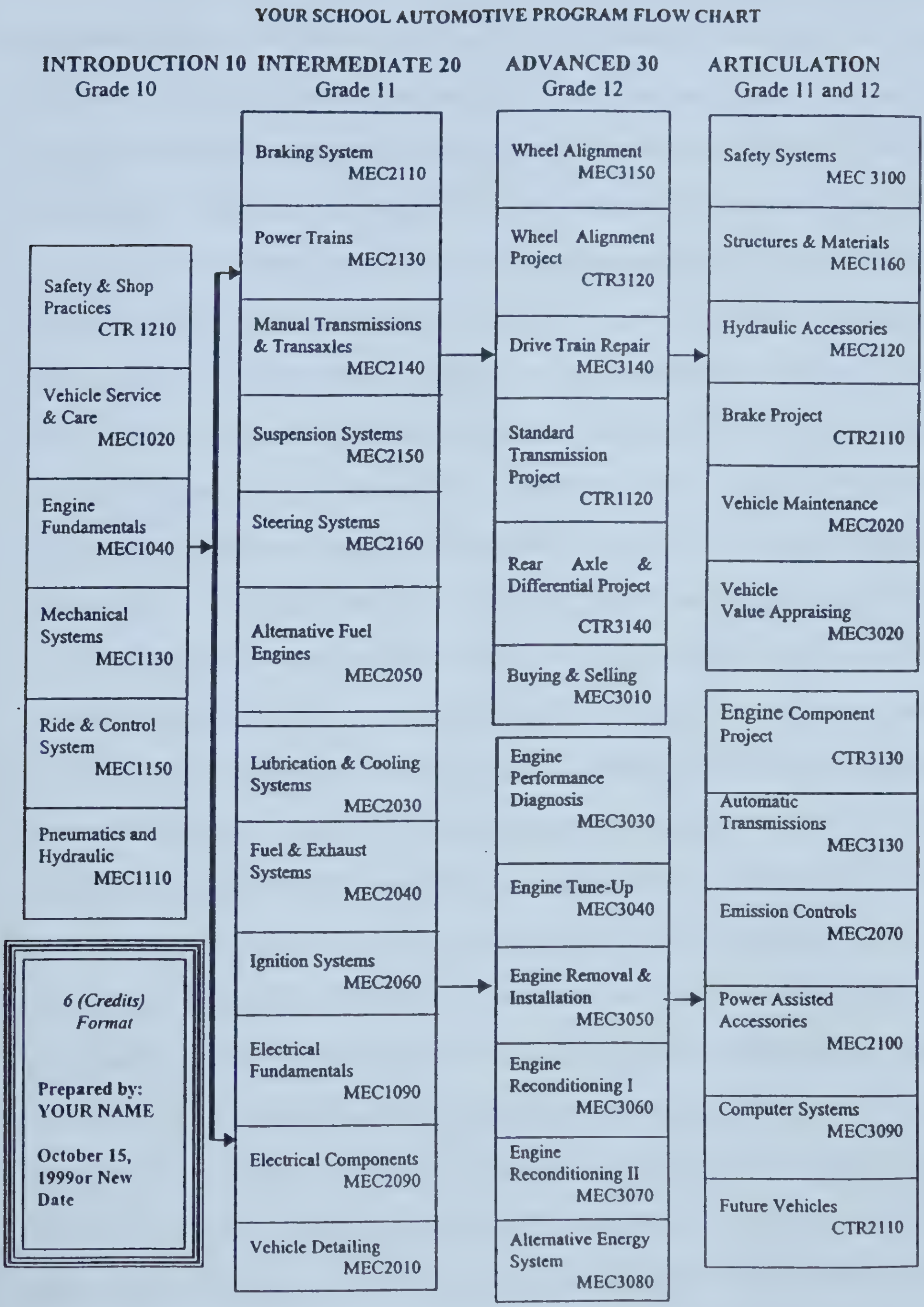

Figure 1. Automotive program flow chart.

Some schools do not realize the importance of organizing the equipment and the duplication required with the varying possibilities of student-teacher ratios. If students travel to the crib only to find that the tool they require is already out, the student must find out who has the tool, which is already an off-task behavior. In industry this situation would be noted, evaluated, and remedied almost immediately. After the student or group of three students has determined which of other groups possess the needed tool(s), they must move from the crib to the service bay, where they now disrupt the group that is probably using the tool(s). There would now be six students and the tool crib student all off task. It is frustrating for all those involved. The teacher, who has probably become aware of the situation, has to explain the inadequacies of the program and that waiting for the tool(s) is acceptable in the school. Inadequate numbers of tools for the student-teacher ratios present a difficult situation for the students. The best and easiest way to determine the required number of each specific tool and piece of equipment is to have a tool wait sheet for the students or to have the crib attendant note which tool is required, and the teacher can then determine which tools need to be purchased. Some of these tool-wait-sheets are so lengthy that students are off task for extraordinarily long periods of time, and the schools must be held accountable to provide the learner with the tools necessary for learning the concepts of the automotive program. When students must wait for common hand tools such as wrenches, screwdrivers, and sockets, as well as more specialized tools, their learning is affected negatively. Both in industry and in college, adult students and/or workers would not tolerate being denied the opportunity of being successful. The colleges have tool crib attendants, and in instances in which tool numbers are low, they make purchases to remedy the situation. Some college apprenticeship programs have students supply their own common hand tools. The apprentices usually own these basic tools. Tool ownership is rare with pre-employment college programs and high school programs. Colleges and schools cannot always purchase great numbers of expensive shop equipment, but most organized school, college, and commercial shops

have indicated that expensive specialty tools are rarely used simultaneously. The teacher must consider this balance of the numbers of tools and students' requirements to determine the feasibility of purchasing tools to keep students on task.

Table 15 and Analysis

Table 15

In One Year, Your School's CTS Automotive Program Would Have Each Student Completing How Many CTS Modules/Courses?

School no.	Number	Comments/explanation
1.	20	*No Response*
2.	5	Most students can only fit or are willing to commit to 5.
3.	5	Grade 10 – 5 Grade 11 – 10 Scheduled ½ day for 1 semester. Grade 12 – 10 Scheduled ½ day for 1 semester.
4.	*No Response*	Introductory – 5-6 modules Intermediate 10 modules Advanced 10 modules
5.	*No Response*	5 – Auto 12 10 - Auto 22 15 - Auto 32 3 – Autocare 22x
6.	*No Response*	15 Auto 32 10 Auto 22 5 Auto 10
7.	6-12	Depending on the student, some students are allowed to take Mechanics courses all year.
8.	*No Response*	Depends gr. 10 – 5 gr. 11 – 10 gr. 12 – 10 Total = 25 for 3 years.
9.	*No Response*	Grade 10 – 3 cr. Grade 11 – 12cr. Grade12 – 12-20cr.
10.	*No Response*	Juniors complete 5 or 6 credits/semester Seniors complete 10 credits/modules/semester.
11.	5 to 15	It depends on which grade level
12.	5	In all grades

(table continues)

School no.	Number	Comments/explanation
13.	*No Response*	5 modules per 5 credit section.
14.	*No Response*	Gr.10 = 6 modules per semester Gr.11 = 12 modules per year Gr.12 = 12 modules per year
15.	35	A student in 20 first semester and 30 second semester would have 15+30 credits [*Sic*] 10 levels are all 5 credits.
16.	*No Response*	*No Response*
17.	5	Most students are more focused on core subjects. CTS Courses are an option and unfortunately most students treat them or view them as such.
18.	6-12	Some students take one class each semester. Often the auto shop is a "dumping ground" for students that don't do well in regular classes.
19.	36-42	The student who completes his/her academic requirements first and then fills their timetable with automotives could receive 36-42 cr.
20.	15	If they enrol in the Junior & Intermediate programs. [*Sic*]
21.	3-6	*No Response*
22.	10-15	This total is calculated on an average from the students the [*Sic*] I know have taken other CTS areas.
23.	10	We offer 5 credit item per semester.
24.	5-10	Predominantly 5 modules/year. Approximately 3% have 10 complete modules.
25.	6to7	*No Response*
26.	6-12	*No Response*
27.	5	Some students in 3 of 3 into openings therefore 5+6+5=16 credits
28.	3-9	*No Response*
29.	6	*No Response*
30.	5or10	We offer 5 credit Grade 10 courses, 5 and 10 credit grade 11 courses and 10 credit grade 12 courses.
31.	12	*No Response*

(table continues)

School no.	Number	Comments/explanation
32.	31	*No Response*
33.	*No Response*	Wide Range 2-35 credits(modules)
34.	6	Some students in semestered courses may complete as many as 12 modules.
35.	6/12	6 in first year auto & 12 in the second & third year of auto.
36.	15	3 – gr. 10 6 – gr. 11 up to 9 in gr. 12

In one year, your school's CTS automotive program would have each student completing how many CTS modules/courses?

The intent of this question was to provide the reader with an understanding of the aspects of course bundling and timetabling of automotive programs for the semester or for the school year in Alberta's high schools. However, 10 of the 36 teachers responded with "No response." This is significant in that these same teachers must have understood the basic meaning of the question, because 8 of those 10 teachers provided complete or partial answers in the comments section of the question. Of these teachers who had no response, it may be that they did not know how many modules/courses the students would take because of timetabling and course scheduling and therefore commented by providing the formula or a breakdown of the numbers of students, classes, and possible credits that their students could receive in the program. Most schools are discovering through timetabling trials that six-credit Grade 10 courses work the best because they allow the students enough repair time to fully appreciate the program after covering the module on safety and spending a fair amount of time on tools, measuring equipment, and fasteners. Some schools that offer a three-credit Grade 10 introductory course find that students comment that they hardly have time to experience even basic repairs because of the administrative, safety, procedural, and tool knowledge that they need to ensure a safe,

organized shop environment. Another problem with the three-credit Grade 10 bundle is that subsequent automotive CTS courses do not allow for extra time to cover tools safety and fasteners. The lack of knowledge of wrench sizes, tool names, and all of the safety procedures leads to frustration for the teachers and the students early in the Grade 11 intermediate courses. This three-credit format is further complicated because certain Grade 10 courses are prerequisites for some of the intermediate and advanced level courses. This makes it impossible to receive funding for subsequent courses because after an audit the school will be charged the financial credit allotment, and the student will not receive credits for those courses without having completed the prerequisite Grade 10 course(s).

The intermediate and advanced level courses are usually 10 to 12 credits, with the most popular timetabling method allowing the students two consecutive periods in the morning or the afternoon. Some high schools work with junior high schools to have the CTS industrial arts teacher cover material that makes it possible for students to challenge courses when they get to Grade 10. This challenge process allows students to receive one credit for each course in which they display competency, and the school can receive 20% of the credit enrollment unit (CEU) for providing the evaluation process. The real benefit is that the student already has determined that automotives is the CTS area of choice and has begun to acquire some of the introductory skills required in the automotive program.

Some schools have deviated from these credit allotments and timetabling examples and have realized that the dynamics of the programs change in a less-than-favorable manner. Most of the respondents have indicated by their comments that the following is the most logical and popular methods of credit allotment and timetabling:

Grade 10	=	5-6 credits
Grade 11	=	10 credits
Grade 12	=	10 credits
TOTAL		25 credits

Table 16 and Analysis

Table 16

How Many CTS Modules/Courses Outside Automotives Are Offered in Each School Year?

School no.	Number	Comments/explanation
1.	6	*No Response*
2.	8	Composite High School
3.	*No Response*	Business Ed, Legal Studies, Design Studies, Electronics, Communication Tech, Construction and Fabrication Foods, Tourism, Clothing and Textiles, Cosmetology, Wildlife (all programs have fulltime instructors) [*Sic*]
4.	*No Response*	Construction Tech – 6 – 5 credit courses Info Pro – 12 courses/Beauty Culture [*Sic*] –7 – 5 credit courses Communications – 2 courses/Food sciences – 8- 5 credit courses Tourism – 5 – 3 credit courses
5.	2,000	there are 36 full time CTS teachers
6.	*No Response*	We offer welding, autobody, cosmotology [*Sic*], cabinet making, home maintenance business, comtech foods, all cts courses [*Sic*]
7.	8	Courses
8.	25	35 depending on extra work & commitment (race student)
9.	*No Response*	`
10.	*No Response*	Autobody, Welding, Comtech, Drafting, Building Constr, Foods, Culinary, Cosmo, Clothing, Electro-tech.
11.	*No Response*	A lot. We run full Wood Construction, Welding, Autobody, Cosmotology *[Sic]*, Cabinet Making, Home Maintenance, Business, Comm Tech, Foods,…
12.	0	*No Response*
13.	*No Response*	*No Response*

(table continues)

School no.	Number	Comments/explanation
14.	*No Response*	Foods, sewing, Drafting, Autobody Building Construction, Beauty Culture, Visual Communications.
15.	?	*No Response*
16.	11	*No Response*
17.	8	Composite High School
18.	*No Response*	We are a vocational school even with our low enrollment. Welding, Drafting, Wood, Cosmetology, Computers, Cooking
19.	4	MAX PER QUARTER. 3 – CAREER TRANSITION MODULES 1 – FABRICATION STUDIES MODULE
20.	*No Response*	Welding, autobody, building, commercial foods, fashion, & electrical etc.
21.	11	*No Response*
22.	20	*No Response*
23.	510	17 – Depts x 3 Classes x 5 credits per semester x 2 semesters
24.	160-180	Construction 15, Info Pro 15, Computers 15, Fina Mgt 15, Design 15, Drafting 15, Art/Photo 25, Foods/Fashion 30, Work Exp 15, RAS 15 –3 0. [*Sic*]
25.	?	Building construction, welding, machining, commercial cooking, Beauty culture [*Sic*], cabinet making, vis. Com, Tourism, Business Ed. [*Sic*]
26.	384	*No Response*
27.	*No Response*	Many! Total of 11 members in department.
28.	?	*No Response*
29.	7	*No Response*
30.	25	*No Response*
31.	7	*No Response*
32.	384	*No Response*
33.	Too Many	There are only so many students, we are spreading ourselves thin! More does not = quality!

(table continues)

School no.	Number	Comments/explanation
34.	130- 150	Modules are offered in this school. We offer CTS in every discipline. Performing Arts, Math, Science, P.E., S.S., English. In almost every subject. I didn't think that this was the original intent of C.T.S. It has been bastardized for money. [*Sic*]
35.	275	We offer 308 modules and 35 in automotive.
36.	*No Response*	Don't know!

How many CTS modules/courses outside automotives are offered in each school year?

The data from this question will not be analyzed as too many respondents gave an answer of "No response".

Table 17 and Analysis

Table 17

How Would You Rate Your School's Tracking Process of CTS Modules/Courses?

School no.	E-A-P	Comments/explanation
1.	P	*No Response*
2.	P	And we are a leader in the tracking process.
3.	P	LEFT UP TO TEACHERS.
4.	A	*No Response*
5.	P	*No Response*
6.	AP	*No Response*
7.	P	No tracking is done, however the teacher's in the Department agree not to teach overlapping modules. [*Sic*]
8.	A	*No Response*
9.	A	*No Response*
10.	EA	*No Response*
11.	A	It is a lot of paper work and time & pray there are no mistakes.
12.	EA	*No Response*
13.	P	*No Response*
14.	A	*No Response*
15.	A	*No Response*
16.	A	*No Response*
17.	P	Supposedly we are leaders in the tracking process.
18.	P	Tracking is a joke in this school. The office has no accurate methods. I use a recipe box and keep track of each student on their on separate card! [*Sic*]
19.	EA	MY SCHOOL IS CURRENTLY CHANGING THEIR PROGRAM SO…THEY DON'T TRACK, I DO.
20.	P	Like most new government programs "they open the library before they buy the books" Alberta Learning should provide one!!!!!

(table continues)

School no.	E-A-P	Comments/explanation
21.	A	*No Response*
22.	EA	*No Response*
23.	A	Many hrs. spent on tracking.
24.	A	SIRS – inadequate and unreliable system.
25.	A	The program + management of program is the (sh_ _s) ask any one who uses it in a large CTS Base area. [*Sic*]
26.	A	*No Response*
27.	EA	*No Response*
28.	P	*No Response*
29.	E	*No Response*
30.	A	Tracking is done with SIRS which means within the city. Not done on a province wide basis to my knowledge. [*Sic*]
31.	E	*No Response*
32.	A	*No Response*
33.	P	*No Response*
34.	A	*No Response*
35.	P	*No Response*
36.	*No Response*	I don't know.

How would you rate your school's tracking process of CTS Modules/courses?

This question allows the reader to gain an understanding of the automotive program's course tracking methods in CTS and the particular aspects involved with the automotives strand. The underlying theme of the responses is that the tracking methods currently being used are inadequate, because one third of the respondents chose *poor* and another one third chose *average*. The few remaining respondents chose the box between *average* and *excellent*, with two respondents choosing *excellent*. It must be pointed out that because many of the schools are now bundling courses for their programs, the confusion surrounding student course tracking has decreased. The tracking of automotive strands in CTS is still many times more complicated than what was required for the old

curriculum. Many schools are struggling with tracking issues (respondents 20, 24, 25, 30). Some schools have realized that it is very important to choose the correct modules for the school and then assemble them in a carefully laid out flowchart. The correct modules for the school are based on the school's equipment and teacher knowledge. The best flow chart can be assembled by the proven example provided in Appendix D labeled as "Program Flow Chart" and by the Apprenticeship Board's articulation requirements provided in Appendix E. It soon becomes apparent that a school's ability to choose any of the modules that it desires and still meet all of the prerequisites and articulation requirements and have a designated journeyperson for the recognized modules becomes extremely difficult. Many schools reported that the grading portion of the new CTS curriculum is too time consuming. Many of the teachers suggested that because the modules do not always correspond to the report card dates, completed marks and in-progress marks are simply confusing for all those involved. With so many marks per student, it is not uncommon for a report card to have a module with only one or two graded assignments on it. The low number of graded assignments translates to students' marks being higher or lower than what might be expected, and the teachers have to deal with concerned students and parents who view the report card. Teachers have also commented on the advantages of doubling the periods of the automotive program so that fewer numbers of students take more modules. This is beneficial in that the teacher can get to know the students better and the students have more quality time in the shop because setup and cleanup time remain the same. Report card processing is also easier for all those involved because more of the module marks can be shown on the students' report cards, giving them a better understanding of the students' progress in the program.

Many of the automotive programs in the province are attempting to deal with these issues on their own and are not taking advantage of the experience gained from other programs, schools, and districts. This is detrimental to all those involved because the urgency in dealing with these issues may make a difference in a program's growth or

decline. Some teachers, administrators, and district personnel have indicated that the guidance given to those who have to deal with tracking issues of the new CTS program is minimal or nonexistent. Many teachers have identified the computer marks programs used to record the grades of the students as very time consuming and laborious. With an automotive teacher's estimated salary at $58,000.00 per year, many have suggested that, with the many hours of data entry and having to learn many constantly changing marks programs, the districts should better utilize the strengths of the teachers for their curriculum skills. They should hire data-entry personnel who are skilled and are much more cost efficient. Schools that have attempted this have had tremendous success. The colleges have also removed many of the administrative duties from their instructors to best utilize the skills of their teaching and administrative personnel. As with industry, cost efficiency can have a positive effect on designating the skills of each job description. This factor is particularly true in the province's automotive programs because many of the teachers still have strong roots relating to the efficiency of industry.

Tables 18 and 19 and Analyses

Table 18

How Much Is Your CTS Automotives Program's Yearly Budget?

School no.	$	Comments/explanation
1.	9,000	*No Response*
2.	12,500	May be reinstated to $15,000.00.
3.	14,000	*No Response*
4.	13000	*No Response*
5.	28,00	*No Response*
6.	21000	*No Response*
7.	3500.00	This amount is the operating budget for two auto shops.
8.	6000	*No Response*
9.	*No Response*	$20,000 for 15 courses.
10.	0	$0 as of 1999/2000. We are expected to break even. Extra money may be assigned for technology and/or texts.
11.	21000	With expected revenue.
12.	4000.00	*No Response*
13.	25,000	Shared with autobody.
14.	8000.00	$30 per student with a $20.00 shop fee per student.
15.	Varies	Has ranged from $1800 → $5000 dependant on administration (since school based budgeting was instituted).
16.	63,000.00	*No Response*
17.	12,500	This is for 2 labs and 4 instructors. Hopefully may be reinstated to 15,000.
18.	2,000	I feel this programs has always been underfunded when the numbers are examined. We have started charging the students to generate additional money. [*Sic*]

(table continues)

School no.	$	Comments/explanation
19.	12,000	THIS AMOUNT IS CURRENTLY UNDER REVIEW BY AN INTERNAL BUDGET COMMITTEE.
20.	6,000	Alberta Learning needs to provide more funding for CTS. They know it costs more to run.
21.	13,000.00	*No Response*
22.	*No Response*	Not shure of these figures at the time. [*Sic*]
23.	15,000	*No Response*
24.	3,500	This includes hand soap, solvents, towels, repairs, brooms, pens, pencils, photocopying, etc. Left over monies go to maintaining equipment and buying basic supplies re: welding supplies, consomables used in mec [*Sic*]
25.	8,000.00	Max budget expense 8,000.00. Income $18,000. Expenses $26,000.00. With open ended parts for resale colum. [*Sic*]
26.	*No Response*	*No Response*
27.	13,000	*No Response*
28.	10,000	*No Response*
29.	11000	*No Response*
30.	8000.00	This is for both shops.
31.	11,000	*No Response*
32.	----------	*No Response*
33.	15,000- 10,000- 7,500 →	It would be embarrassing to let you know! $ A lot at one time next to nothing now!
34.	*No Response*	*No Response*
35.	2000.00	*No Response*
36.	3000	For two shops – this includes paper & office supplies

Table 19

What Extra Money, If Any, Does Your CTS Automotives Department Create in a Given Year?

School no.	$	Comments/explanation
1.	4,000	*No Response*
2.	0.00	*No Response*
3.	500 - 1,500	DEPENDS ON YEAR, CLASS CUSTOMERS, AND STUDENT QUALITY
4.	Unknown	Our department has taken the stand that we are not "in business". Our programs are for learning and thus we focus on that. Any profits from parts sales (20% above cost) is returned to the general school budget and distributed as needs arise.
5.	3000	Parts mark up
6.	3000	*No Response*
7.	Unknown	I do generate revenue through the sale of parts on customer vehicles, however I do not receive budget updates regularly enough to known the amount. Eventually I hope to track my own shop budget when time and equipment needed are available.
8.	Break even	Approximately 20,000 revenue created but it goes right back into parts and equipment + budget. We charge 10 – 20% above cost on parts + service fee.
9.	2,000	Some customer work.
10.	2,500.-	Parts and service sales, turning rotors, drums, alignments, etc.
11.	3000	Parts mark up. We are trying a car raffle this year.
12.	1500 – 2000	FROM PARTS MARK-UP ON WORK ORDERS.
13.	5000.00	*No Response*
14.	*No Response*	We do same outside work but with all the new technology parts and information needed, this income is quickly used up.

(table continues)

School no.	$	Comments/explanation
15.	None	In the part –profits from customer service were put back into the program – now they go into general funds. Previous years have yielded $7 – 12,000.
16.	$30,000.	*No Response*
17.	0	Not intended to. Supposed to be non-profit.
18.	None	I feel that the school should fund the program if they think it is important. No one asks me, as a social studies teacher, to generate money.
19.	0	WE ANALYSE AND CHANGE THE PROGRAM YEARLY TO ACHIEVE NUMBERS IN THE BLACK. BUT THERE ALWAYS SEEM TO BE SO MANY UNFORSEEABLE EXPENSES THAT WE CONSIDER OURSELVES LUCKY TO BREAK EVEN.
20.	?	We tend to break even. In budget $6000, year end $0 in account. Why should we be expected to generate funds – what other K-12 programs has to??
21.	30,000.00	*No Response*
22.	*No Response*	This number $ would depend on the Govt. Funding that would come toward CTS in Education.
23.	3,000	Service work – recycled parts + car bodies.
24.	0	*No Response*
25.	Need to phone Principal for this answer	Board expects a balanced Budget so everything is charged out even printer paper in CTS programs.
26.	10-25,000	*No Response*
27.	30,000	Note – does not come back into Auto pgm.
28.	/	*No Response*
29.	5000	*No Response*
30.	0	We do not operate to raise our own revenue.
31.	5,000	*No Response*
32.	----------	*No Response*
33.	----------	We are here to teach and students to learn. If $ is the bottom line, we are in the wrong career!

(table continues)

School no.	$	Comments/explanation
34.	Zero	See questions 1 Question 1 = This is a Mechanics program not an Automotives program. We have 67 min. classes. The students work on their own vehicles. The students lack the skills where I would feel comfortable to let them work on customer cars,
35.	*No Response*	*No Response*
36.	Not sure	Don't know how much profit our senior teacher generates on his part time work here.

How much is your CTS automotives programs yearly budget?

What extra money, if any, does your CTS Automotives Department create in a given year?

These questions inform the reader about some of the issues facing Alberta's automotive programs concerning the costs of running and maintaining these programs. It must be noted that respondents' comments suggested that the amount of the yearly allotted budget is one of the main indicators of a successfully operating program. Many respondents who have been teaching in automotives commented that years ago budget allotments were higher and the shop expenses were considerably less. The average yearly budget stated within the collected data is approximately $8200.00. Many reported that budgets are continually being reduced (respondents 33, 17).

Some schools have different policies on how funds are allotted to the CTS shops. Some teachers reported that funds must be spent immediately in order to guarantee that if the school begins to run a deficit, the allocated funds cannot be taken back to restore the school's general account. This creates a spending frenzy in September and October to exhaust the yearly budget. These same schools suggested that they use customer service as a means to purchase other items required during the balance of the school year. They also suggested that some schools that have had these funds taken back create a separate

account as an automotive club account, which is perceived as consisting partly of student-generated club money and is therefore protected. The student automotive club funds can also be carried over from June to the following year. Usually if a shop repair account and shop budget account have funds remaining, they are automatically redirected at the end of June to the school's general revenue account. When this happens, the funds are no longer available to the automotive programs. Again the automotive club account can protect these funds, because student club funds raised that have not been spent by June are carried over to the following year for larger student activities. Examples of these larger fund-raising ventures that may continue for longer than one year are shop project vehicles and the more expensive field trips with larger groups.

It must be noted that many of the successful automotive programs have taken control of their own finances by various means of generating funds for the automotive program. Some of these methods for generating funds include fund raising by selling shop services as a fund-raising technique. Students within the program canvass the community for $50.00 donations, which include an oil change service or vehicle detail service. The most popular funds-generating method is through customer service. Some schools have a policy that charges retail fees for parts and a user fee which ranges from $5.00 to $400.00, or from 10%-25% of the cost of the parts required for each repair. Some schools change a user fee for each customer. They consider the customer's ability to pay, and they charge accordingly. With this method students would be charged a lower user fee, whereas corporate customer service work from the oil industry companies would pay a higher shop fee. Some schools have a typical flat rate in place at $10.00 an hour. These schools reported that the students gain valuable experience in estimating the time and cost of repairs, which fosters relevant experience in processing shop work orders using the flat-rate method. It must be understood that this practice models what is typically done in industry. Students accept and seem to feel that this policy on fund

generating is a positive way of raising funds to repair and replace shop equipment and tools.

Some schools fund-raise by soliciting industry for donations. This method has had limited success, though when a resourceful contributor is found, the result is appreciated, and another valuable link with the community and/or industry is created.

Some other schools hire a journeyperson aide with the understanding that the aide will repair customer service vehicles with the students to generate the aide's wage and program funds. These methods of fund generation may seem quite different when compared to those of automotive programs that simply rely on the allocated funds provided from the school's finance office. Those teachers who incorporate these different methods of fund generation commented that they simply wanted to take charge of their programs' negative financial situations. An important part of the equation that adds to the success of these methods is to have a clearly written shop policy on the customer service fee. Some teachers indicated that it is very important to properly estimate the repair and confirm the amount and payment details with the customer before the repair begins. Some schools indicate that if customers disagree with the amounts of the repair costs, then the automotive shop teacher will then lower the amount to satisfy the customer and no longer do repairs for that customer.

Student fees have been quite successful at some schools. It seems that the students of the programs and their parents accept payment of these fees, which range from $30.00 to $50.00 and will sometimes include text rental or coverall purchase or lease (respondent 14).

Some programs have reconditioned a vehicle and then have raffled it off. Others have sold the reconditioned vehicle to the school for a profit to the automotive program. The vehicle is then used by the student council as a prize for students who have earned attendance, grade, or participation awards.

The underlying theme is that funds can be made available to automotive programs though a variety of methods. There are also strategies that can better protect the automotive funds from being taken back from the school financial office should administration deem that the funds are more desperately required somewhere else. Those schools that incorporate some or most of these methods of generating funds can usually keep up with their shop's requirements for new tools and the maintenance costs that are associated with running an automotive program. Some teachers have suggested that successful fund raising not be publicized or that the accounts from fund raising not be allowed to become large because this has created negative feelings with other school departments who cannot generate their own funds. Some other subject areas have suggested that these large fund-raised accounts be shared because of what they perceive as excessively large fund-raising accounts. Many of the costs related to automotive tools, equipment, and the shop are quite expensive, and other departments are quick to point out that the large allotments of the automotive program would support many academic programs comfortably. Some athletic departments stated that their fund raising has resulted in their teachers also having to deal with similar issues. Some athletic programs are very expensive, and major fund-raising efforts must take place to provide students with all of the trips, equipment, and supplies.

Table 20 and Analysis

Table 20

Please Check Any of the Following Extracurricular Items Your School's Programs Offer

School program	School #*	Comments/explanation
School race car	1, 2, 7, 8, 9, 13, 17, 34	9= School Board will not let student drive them. 14= Not Allowed 17= Race car done outside of the school because of insurance, and liability 18= (not this year – have in past) 19= Division Liability?
RAP Program	1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 33, 34	25= I do not like RAP program. Does more damage to Work/experience program & Takes students out of the shops here in the school and puts them into programs when they know nothing [*Sic*]
Auto work experience	1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35	19= The auto work experience program is offered at the advanced (32C) level and is an industry 6 credit course [*Sic*]
AMA/Ford auto skills	1, 4, 6, 9, 10, 12, 14, 15, 18, 19, 20, 26, 29, 30, 31, 32, 33, 34	*No Response*
Automotive jackets, etc.	7, 11, 26	*No Response*

(table continues)

School program	School #*	Comments/explanation
Other programs	4	Auto club is offered as interests are apparent
	7	Very little extra-curricular work is done due to lack of time , money and legal libility issues [*Sic*] SAIT High school tech fair
	9	No Skills Canada
	19	Yes Skills Alberta
	20	Auto club
	22	Skills Canada, Ford Competition
	25	Skills Canada Competition
	30	Skills Canada Alberta
	33	Show & Shine

*School number indicates a YES answer.

Please check any of the following extracurricular items your school's programs offer.

The purpose of this question is to profile the aspects of extracurricular expenses for students of Alberta's high school automotive program. The Registered Apprenticeship Program (RAP) is reportedly the most popular extracurricular activity that schools offer in CTS. Some teachers have reported that the RAP program is successful. These teacher report that it does benefit the few students in the program. Other teachers reported that some students of this small group did not experience success with the program. A few teachers have indicated that because of the large sum of money expended on this program and the low numbers of students who actually achieve success in it, they felt that the money could be better spent on the actual automotive program in the school. Other teachers reported that the RAP program takes a few of the students out of already declining programs, which further affects the school's program in a negative way.

The schools also offer work experience that seems to be more viable in automotive programs, because the students remain in automotives classes. Since students involved with the work experience program outside of school hours, this does not hinder

the automotive program. Some automotive teachers take a vital role in liasing with industry to ensure a positive experience for all. Some schools have a work experience officer who arranges placement and evaluates the work experience program.

With both the RAP program and the work experience program, commercial and industrial firms have routinely suggested that the work ethic of the student is the most important factor in the success in the automotive experience, not the level of automotive knowledge and acquired skills. These industry comments coincide with teachers' comments about students in automotive programs throughout Alberta.

The balance of the extracurricular activities allow schools to enable students to experience other positive aspects of the automotive program. Most schools reported that the extracurricular activities create a positive atmosphere for parents, school staff, and the community. The link with industry seems to be the main reason for the extracurricular automotive program's success as reported by the stakeholders during the initial pilot study of this research project.

Most teachers commented that the AMA Auto Skills Competition and the Skills Canada Challenge are other indicators of Alberta's automotive program's success. It becomes apparent that only those teachers who are willing to teach those extra hours of theory have high-placing students in these automotive programs. Students have identified the AMA Skills Competitions as one of the highlights of their school experience.

Some schools commented that the recent bureaucracy and paperwork required for field trips of any type are so exhaustive that some teachers have reduced the number of these field trip outings. Some race car programs have had to be dropped after 20 years of positive student experience; district liability was reported to be the reason for ending these successful programs. Some schools use the attraction of these extracurricular activities as a justification for fund raising for the activities as well as for the automotive program.

Some schools have policies on providing coveralls. In some of the automotive programs they are provided to the students for a fee. On a lease basis, some schools use a supplier that provides the student with the correct size, and places an iron-on name patch on the coveralls. The success of this method is obvious because high school students outgrow their coveralls quickly. Each student can also receive free repairs and pay for cleaning at a nominal fee if they choose.

Some schools also possess large iron-on patches with an automotive picture in the program's colors. This large patch is placed on the back of the coveralls and gives the students a very professional look, further supporting group involvement in the automotive program. The iron-on patches can then be transferred to other coveralls at a later date.

Virtually all automotive programs that offer many of these extracurricular activities are experiencing a growth in their program, whereas the schools that do not or cannot offer such extracurricular activities are experiencing a decline in program enrollment.

Table 21 and Analysis

Table 21

When Timetabling, Are Your Automotive Students Scheduled for the Year or ½-Year Automotive Modules?

School no.	Year	½ year	Other	Comments/explanation
1.	X			*No Response*
2.		X		*No Response*
3.		X		*No Response*
4.		X		We offer 10 credit blocks to 2c/2h & 3c/3h students. 1c's are offered 5 credit blocks. We are proposing 3 credit introductory blocks in the future. [*Sic*]
5.		X		*No Response*
6.	X	X		*No Response*
7.		X		*No Response*
8.		X		*No Response*
9.		X		Grade 10's 3 cr is 10 weeks.
10.		X		*No Response*
11.				We run semestered programs but they are full time courses.
12.		X		*No Response*
13.	*No Response*	*No Response*	*No Response*	It depends on the circumstances of each student.
14.		X		*No Response*
15.		X		*No Response*
16.	X			*No Response*
17.		X		*No Response*

(table continues)

School no.	Year	½ year	Other	Comments/explanation
18.			X	We are on a semester system. Sometimes the semester is split into half for courses like CALM. The students might end up with 8 weeks CALM + then 8 weeks Auto.
19.			X	WE ARE ON THE QUARTER SYSTEM (4 PERIODS – 10 WEEKS EA.) AND STUDENTS COULD BE SCHEDULED FOR THE WHOLE YEAR.
20.			X	Does not apply.
21.		X		*No Response*
22.		X		*No Response*
23.		X		Can take 10 intro – then whatever they decide – can earn as many as 15 [*Sic*]
24.		X		*No Response*
25.	X			7 blocks 1 spare
26.		X		*No Response*
27.		X		*No Response*
28.		X		*No Response*
29.		X		*No Response*
30.		X		*No Response*
31.		X		*No Response*
32.		X		*No Response*
33.	X	X		*No Response*
34.	X			Two classes are semestered. Mech 20 Sem 1 and Mech 30 Sem 2. Back to back. [*Sic*]
35.		X		*No Response*
36.		X		*No Response*

When timetabling, are your automotive students scheduled for the year or ½-year automotive modules?

The responses to this question reveal that very few administrators of high school automotive programs understand that the timetabling of the program can greatly affect the success of the program. The quantitative statistics of the teacher-perception survey responses indicate that six schools organized their timetables for their students for the entire year, whereas 29 schools planned their automotive scheduling one half semester at a time. For those schools that plan for the entire year, they must correct for failures and for new students in the second semester. This process is slightly easier if it is done each semester. As discussed in the analysis of Table 22, the sequence of the modules in the bundles is important, as is the timetabling of the bundles in each given school year to support the steady, ongoing nature of the previous year's students. A common scheduling issue is that the administration and the counselors do not realize the severity of their actions when they affect Grade 10 automotive classes through disrupting the sequence of courses/modules. It seems that if the automotive teacher does not endeavor to educate the administration and the counselors as to the importance of timetabling and what will be the effect on automotive students for years, then mistakes with the timetabling will occur routinely. It must be understood that if a timetabling mistake occurs for Grade 10 students, the ripple is felt for the next two to three years. A wise administrator suggested that all new timetabling methods be attempted if possible during the second semester with the Grade 12 classes only. This administrator realized that if the trial was unsuccessful, the students would have graduated and would no longer be in the program. However, many administrators and counselors are unaware of this approach to timetable experimentation or believe that trial scheduling should be attempted with the younger Grade 10 students.

There are many timetabling issues that can affect the automotive programs. One common mistake is to overload the Grade 10 classes, which usually leads to student

dissatisfaction. Such dissatisfied students usually do not continue in the automotive program. Another common mistake is mixing the grade levels or adding IOP students. When students experience dissatisfaction, they may try another CTS strand or discontinue taking CTS course altogether. This results in serious repercussions for the automotive programs. Mixing of grade classes is discussed in more depth in Analysis 11 because the same research data explain why automotive programs struggle when teachers attempt to teach two or more modules simultaneously. Another timetabling issue that is detrimental to the program's success is the duration of the doubling up of class periods. There are many different period arrangements, though only the simple ones work in automotives. If schools do not double up the blocks for automotives, the time spent in the shop may be too short to do the setup and then the cleanup at the end of the class. Some schools reported that the academic classes are scheduled first so that on some days the students have a double period of automotives and then another class or two scheduled in between their automotive classes. Some schools have a floating period that cycles through the week. This is usually of no concern to the academic subjects and some other CTS strands, although it creates the same problems for setup and cleanup in the automotive classes. In this situation there is also the possibility that the floating class will end up at the end of the day. This means that unless the student stays after school, the advantage of doubling up periods is negligible.

Many of the teachers of CTS automotive programs reported that administrators and counselors are viewing the automotive program as a place to direct those students who struggle with their academic classes. There may be some CTS strands that are more labor intensive and may require a lower academic standing, but the automobiles and automotive programs of today do not have the luxury of being simple. Colleges are struggling with many of their apprentices for this very reason. The related subjects portion of the apprenticeship program is constantly required to do more with the adult students to ensure that they have the academic skills to succeed in a modern shop

environment. The same underlying theme is evident in the high school automotive programs. Teachers of other CTS strands reported the need for greater academic standing to better deal with the increasingly complex concepts of technology. Moreover, automotives have evolved tremendously during the last 15 years. While other CTS strands may have advanced very little, or have never required that their students possess strong academic skills, this is definitely not the case with the automotive courses in CTS. Automotive teachers at both the college and high school level agree that the academic skills required to be an automotives student have increased because of the increasing complexity and number of concepts dealing with many of the new technologies found on most contemporary automobiles. Some schools reported that students who struggle with one CTS strand are encouraged to try another and then another. The automotive teachers have commented that this should not be allowed to happen and that an unsuccessful student should be counseled to determine why the student has failed the automotive program in order to direct the student to a different subject or alternative school where he/she may have success.

Some schools have had so many problems dealing with the many variables in timetabling that they have returned to the previous method of posting the automotive classes that will be offered and then letting the counselors and students fill the seats to a capped maximum. This seems to work best because all aspects of the bundled modules/courses can be arranged in an order that guarantees the programs the best timetable for the program. However, there may be the odd class that ends up with low enrollment, but which still has to be offered. The trade off is that there would have been many more low student number classes had the school adopted the policy that has the student choose the bundle of courses. In turn and other bundles that consist of certain prerequisites are canceled due to lack of student enrollment. This creates tracking issues and confusion for the student, teacher and the school administration.

Table 22 and Analysis

Table 22

Does Your Program Have the Necessary Flow Charts of Modules for Students to Achieve Articulation in Automotives?

School no.	Yes	No	Yearly #	Comments/explanation
1.	X		No Response	*No Response*
2.		X	*No Response*	*No Response*
3.		X	*No Response*	*No Response*
4.		X	*No Response*	We offer 10 credit blocks to 2c/2h & 3c/3h students. 1c's are offered 5 credit blocks. We are proposing 3 credit introductory blocks in the future.
5.		X	*No Response*	*No Response*
6.	X	X	*No Response*	*No Response*
7.		X	*No Response*	*No Response*
8.		X	*No Response*	*No Response*
9.		X	*No Response*	Grade 10's 3 cr is 10 weeks.
10.		X	*No Response*	*No Response*
11.			*No Response*	We run semestered programs but they are full time courses.
12.		X	*No Response*	*No Response*
13.			*No Response*	It depends on the circumstances of each student.

(table continues)

School no.	Yes	No	Yearly #	Comments/explanation
14.		X	*No Response*	*No Response*
15.		X	*No Response*	*No Response*
16.	X		*No Response*	*No Response*
17.		X	*No Response*	*No Response*
18.			X	We are on a semester system. Sometimes the semester is split into half for courses like CALM. The students might end up with 8 weeks CALM + then 8 weeks Auto.
19.			X	WE ARE ON THE QUARTER SYSTEM (4 PERIODS – 10 WEEKS EA.) AND STUDENTS COULD BE SCHEDULED FOR THE WHOLE YEAR.
20.			X	Does not apply.
21.		X	*No Response*	*No Response*
22.		X	*No Response*	*No Response*
23.		X	*No Response*	Can take 10 intro – then whatever they decide – can earn as many as 15 [*Sic*]
24.		X	*No Response*	*No Response*
25.	X		*No Response*	7 blocks 1 spare
26.		X	*No Response*	*No Response*
27.		X	*No Response*	*No Response*
28.		X	*No Response*	*No Response*

(table continues)

School no.	Yes	No	Yearly #	Comments/explanation
29.		X	*No Response*	*No Response*
30.		X	*No Response*	*No Response*
31.		X	*No Response*	*No Response*
32.		X	*No Response*	*No Response*
33.	X	X	*No Response*	*No Response*
34.	X		*No Response*	Two classes are semestered. Mech 20 Sem 1 and Mech 30 Sem 2. Back to back.
35.		X	*No Response*	*No Response*
36.		X	*No Response*	*No Response*

Does your program have the necessary flow charts of modules for students to achieve articulation in automotives?

This question is a good indicator as to how the new CTS curriculum is benefiting those students who want to gain advanced standing in the automotive apprenticeship program. The Apprenticeship and Industry Training Division of Alberta Learning compiles records on the students who become apprentices, and patterns may emerge from studying these data. One of the statistics that is kept is how many high school students with 35 credits in automotives go on to become apprentices. Below is a highlighted sample of the pertinent data found:

Total number of students with 35 credits who articulated from 1985 to 2001 451

Total number of students with 35 credits who articulated with CTS 1996 to 2001 0

Total number of students with 35 credits who articulated with the old automotive industrial education curriculum 1985 to 1996 451

Total number of RAP program students 1992 to present 133

These statistics support the teachers' survey responses that only six schools in the province have an automotive program that could have a student articulate. Various schools thought that they might have the necessary flowchart to allow students to articulate, but it became evident that some of the prerequisite courses or the sequence of the courses were either missing or backwards. This means that very few schools in the province, have taken the time to learn and prepare their automotive program with the necessary flowchart to allow students to take the designated 35 credits to articulate. It must also be mentioned that a journeyperson teacher must teach the majority of the courses designated by the Apprenticeship Board. Some schools are unaware of the Apprenticeship Training Act that governs all automotive repairs in the province, including those done in the high school automotive programs. It clearly states that only a journeyperson can repair vehicles other than their own. This is an industry standard that has been in place for many years, yet some schools and Alberta Learning itself appear to be unaware of this portion of the Act. The automotive trade is labeled by the apprenticeship branch as a "Compulsory" rather than an "Optional" trade. One of the main reasons for the legislation from the Local Advisory Committees and Provincial Advisory Committees that a journeyperson be present at all times during automotive repairs, is the safety aspect of all road-going vehicles. This goes back to legislation of the Department of Transport and the Ministry of Transport. The insurance and the legal lobbying groups have been most influential in having all road-going vehicle repaired or supervised by a journeyperson. The RAP programs have had some success, although the

cost of the RAP personnel and the volunteered time that the high school teacher puts in influence whether the program is truly viable. After discussion with the colleges and the Apprenticeship and Industry Training Division of Alberta Learning, it became clear that the autonomous nature of each of these institutions has resulted in a lack of communication and continuity to better prepare students for their next automotive training experience. The student would benefit and probably appreciate as much continuity as possible through Grades 7, 8, and 9 industrial arts program, the high school automotive program, and the college automotive program, and then as an apprentice seeking journeyperson qualification and interprovincial red-seal certification. It seems logical that each of the students' educational institutions would be interested in taking on partial responsibility to establish this continuity from their feeder potion of the journey through to the promotion aspect to educate and guide the student on to the next part of their journey.

There is a shortage of journeyperson mechanics and apprentices in Alberta, and all indicators from consulting with the automotive trade personnel of the Apprenticeship Branch suggest that this will continue for the next five years. The possibility of creating this much-needed continuity among all of the education stakeholders is greater than ever because recent governmental changes have placed all of these educational stakeholders under one administrative umbrella called Alberta Learning.

Some of the teachers who suggested that their programs do offer all the articulation courses added further that the modular approach in the new curriculum has lowered the level of achievement significantly. If the student were to have all 35 credits from the CTS curriculum, the teachers suggested that there would be only a slim chance of these graduates passing the first-year challenge exam. It must be noted that these same teachers have had students articulate and pass the apprenticeship exams while working with the old industrial education program of studies. This topic will be discussed in greater depth in the analysis of Table 27.

Table 23 and Analysis

Table 23

What Textbook(s) Are You Presently Using?

School no.	Name of text	Comments/explanation
1.	*Modern Automotive Technology* *Auto Mechanics Fundamentals & Service*	*No Response*
2.	*Modern Automotive Technology*	Workbooks as well
3.	Stockel Duffy Nash	*No Response*
4.	*Modern Automotive Technology* *Automotive Electricity, Electronics, Computers* *Small Engine Mechanics*	*No Response*
5.	*Modern Automotive Technology*	*No Response*
6.	*Modern Automotive Technology*	*No Response*
7.	*Modern Automotive Technology*	Excellent text book with workbooklet textbook. However, very expensive Text $100.00 Workbook $25.00. NO money available to buy or replace books. [*Sic*]
8.	Stockel-*Automotive Service & Rep.* Stockel-*Auto-Fundamentals* Crouse & Angles-*Automotive Mechanics*	*No Response*
9.	*Modern Automotive Technology*	would like another text for Grade 12 but NO MONEY!! again. [*Sic*]
10.	*No Response*	*No Response*
11.	*Modern Automotive Technology*	*No Response*
12.	*Modern Automotive Technology* *Nash Automotive Fundamentals*	Grade 10 – Nash 5th Ed. Grade 11 – 12 Modern Automotive Technology

(table continues)

School no.	Name of text	Comments/explanation
13.	*Automotive Technology* *Small Gas Engines*	Erjavec and Schaiff [*Sic*] Roth
14.	*Modern Automotive Technology* *Auto mechanics Fundamentals* *Automotive Electricity, Electronics*	*No Response*
15.	Stockel "*Auto Fundamentals*" Stokel "*Auto Service & Repair*"	Mec 10 – Stockel "Auto Fundamentals" – 1996 20/30 – Stockel "Auto Serv. & Repair" - 1996
16.	*No Response*	*No Response*
17.	*Modern Automotive Technology*	Workbook also
18.	*No Response*	I do not use any textbook. I have produced all my own material.
19.	*Modern Automotive Technology* *Automotive Principles & Service*	Modern Automotive Technology – Duffy 1994 Automotive Principles & Service – Thiessen 2nd/4th Edition Costs are a major budget problem for my program
20.	*Modern Automotive Technology* *CDX Automotive Training*	CDX Automotive Training CD-Roms
21.	*Modern Automotive Technology*	-grey book
22.	*Nash Automotive Fundamentals* *Automotive Technology & Systems Approach*	Nash 5th Ed. (Intro Mec) 2nd. Ed. (Inter & Senior Mec) Introductory Automotives use class sets Intermediate and Senior students purchase texts
23.	*Modern Automotive Technology*	Workbook & Text We also have a $10,000.00 All Data Program Hooked to 5 school computers [*Sic*]

(table continues)

School no.	Name of text	Comments/explanation
24.	*Modern Automotive Technology* *The Car Care Book*	Modern Automotive Technology – Duffy Mec 20/30 - Mec 10
25.	*Modern Automotive Technology*	All levels
26.	*Auto Fundamentals* *Auto Service & Repair* *Auto Mech. 10th ed.*	*No Response*
27.	*Modern Automotive Technology*	- Grey book. 1988 94 98 version
28.	*Automotives Tech (Schwarf)* *Auto Service & Repair (Stockel)*	*No Response*
29.	*Modern Automotive Technology*	*No Response*
30.	*Modern Automotive Technology*	Modern Automotive Technology. / Duffy
31.	*Modern Automotive Technology*	*No Response*
32.	*Automotives Mechanics* *Automechanics Fundamentals*	Automotives Mechanics Crouse-Anglin Automechanics Fundamentals Stockel/Stockel
33.	*Modern Automotive Technology* *Engine Rebuilder's Handbook* *Auto Service & Repair*	*No Response*
34.	*Auto Service & Repair/* Stockel *Modern Automotive Technology/* Duffy	These are the Auto texts that we use. We also use texts for small engines, welding etc.
35.	Stockel's *(Auto Service & Repair)* Crouses *(Automotive Mechanics)*	*No Response*
36.	Stechner & McGreffin *Modern Automotive Technology*	gr.10. Stechner & McGreffin gr.11 Duffy Modern Automotive Technology (1994) - gr 12 – he doesn't use a book.

What textbook(s) are you presently using?

The significance of this question is that it will aid the reader in understanding the different texts that are used in the CTS automotive curriculum. Most schools reported that they can afford to purchase a text for each of the students taking the program. Some schools have raised funds in different ways to purchase the needed texts, and some have purchased the texts and have charged rental fees to help recover the cost of the texts, which cost the schools approximately $60.00-$90.00 each. Many schools simply copy the pertinent chapters that match the specific module/course. Most of the texts have teachers' guides, which cost approximately $125.00, and student workbooks, which cost about $12.00 each.

Most teachers reported that these new texts have many assignments that can keep students busy, but many teachers commented that the classroom lab with note taking from overhead transparencies, and participation has students learning the concepts more easily. This is also the most efficient way to teach the theory portions of the automotive training to adults in the college setting. The colleges have tried modular-based learning methods with little success in the past. One college attempted to use a modular competency-based approach in automotives just recently, and it has also failed; the college has returned to the lab-demonstration method with note taking and having all students at the same point participating in the lesson. George MacLean, who is the board chair for the Apprenticeship Board of Nova Scotia and who was the Director of Trades and Technology at the Nova Scotia Community College, pointed out in a letter dated November 2000 to various members of a national apprenticeship delivery council that modular competency-based instruction in automotives does not work:

> Everyone starts at the same point but you quickly have people advancing, people who are average and those who are quite slow. So in a very short time if you have a class of twenty, you can quite literally have 20 different programs going on. With a lot of people at different levels the Instructor can no longer instruct, rather he/she becomes a facilitator (translation: Instructor becomes like a traffic cop at a busy intersection, can only point students in the right direction, hand out learning

> resources, videos, tests etc., and usually spends more with paper and administrivia than he/she does teaching). . . . Morale will definitely suffer because the instructors will know that this is not a good way to teach any trade. In my 25 years' experience, it is my opinion, which is shared by most people I talk to, that the average apprentice must be, and wants to be, taught. (p. 1)

Some teachers of the high school CTS programs who attempted to teach more than one module simultaneously reported that they could accomplish this in the classroom with the theory, but not in the shop or while presenting class labs. Some teachers commented that they could keep virtually all the students in the classroom on task in their different modules with the many assignments in the new automotive texts. Many of the teachers felt that the old curriculum did not require a text because note taking and photocopies of the teacher-guide masters would be sufficient for students to review at a later date.

Regardless of an individual school's program, most schools reported that they possessed at least one class set of texts. The most popular with teachers is the Duffy's *Modern Automotive Technology*. The major reported dissatisfaction with the Duffy text is that it is revised too often. The schools face a dilemma as the texts wear or go missing. A whole class set of texts has to be purchased to have all students doing the same assignment in each module, and different teacher guides and workbooks must also be purchased, as each revision is quite different. A few teachers have attempted to mix editions of the texts throughout the class. This approach has not been successful. The Duffy text is what virtually all of the automotive teachers wanted, a text that is periodically revised to remain current with the automobile. Nevertheless, a few teachers reported dissatisfaction with the supplier not producing past editions. Without the ability to purchase extra old editions when required, the school has no choice but to purchase complete class sets of the new edition. Larger boards have reported that they will stock extra texts in anticipation of future attrition. Most schools reported that they continue to be caught in the dilemma of having to purchase the newer editions, and most have

stopped this practice and copy chapters for the students from the remaining old-edition class set for each module of CTS.

Some schools still use very old texts with relative success. These old texts were rarely revised, so obtaining them is easy. Some are still available in every edition, which makes replacing worn or lost texts economically feasible. The colleges have found that many of the text suppliers do not have one text that is comprehensive enough to use until the next change in course content. The colleges have had great success with student learner packages that consist of instructor-generated materials and other selected works that are in a typical three-hole-punched booklet format. The main advantage is that the individual booklets evolve with the program in an easier and less expensive manner.

A few schools reported the use of Welford Downs Distributing, CDX Automotive Training Series CD-ROM instructional an interactive computer assisted learning (CAI) CDs. The student can select a topic and is guided through the theory of each topic. This has been done successfully at one school using the CTS modules, though the cost of the hardware and the software make the cost prohibitive for most schools to have more than one computer set up with the software. Schools that have purchased the Training Series report that curriculum development with the use of the CD-ROM was quite extensive and time consuming. The teachers involved stated that the CD-ROM format would have also been beneficial with the old automotive curriculum. These CD-ROMS are best used for teaching the general basic concepts of the automobile, because fewer software updates would have to be purchased. Sets of these discs cost approximately $3,600.00, though special pricing has been seen for the package. Some teachers who have had experience with the CD-ROM format reported that it is a great tool for individual students to review what has already been acquired in the typical class/lab interactive lesson.

Another area of concern is using CD-ROM programs that can replace the purchase of repair manuals. These programs are the same popular ones used in industry. These CD-ROM manual programs also include client-tracking aspects and inventory

particulars. Some have parts lists that can be e-mailed to those parts suppliers that use the Internet. Industrial users are finding that these programs are beneficial and are now requesting that apprentices experience the flat-rate aspects of charging out the hours of labor for each particular repair. The parts trade uses programs like these all the time, and each partsperson in the more organized stores wears a headset with a hip-mounted cellular phone. Some schools have attempted to use these systems to better model industry and give the student a sense of the efficiency and reality of industrial practice. In those schools that use the CD-ROM manual, most teachers agreed that they have their place in the high school automotive programs. The teachers with these programs commented that future employers will value the fact that the student has gained experience with this more recent technology. The students enjoy using the CD-ROM programs, though access to the programs is limited because most automotive programs have only one computer. The two popular CD-ROM programs used in the schools are *Shop Key* and *All Data*, which cost approximately $2,700.00 each, with $400.00 yearly for updates. Most schools that have these programs do not update them every year. The colleges have rolling booths that house the computers for the mechanics to use in the service bay near the vehicle, which closely models industrial practice. Schools usually keep the computer with the program on it in the classroom or in the shop office.

Table 24 and Analysis

Table 24

What Percentage of Students Could Possess Their Own Textbook?

School no.	Percentage	Comments/explanation
1.	100	If they wanted this as a career choice [*Sic*]
2.	90-95	No rental system in this board
		Students might be sharing , borrowing, etc text. Each need their own workbook [*Sic*]
3.	0	No textbooks in class sets. [*Sic*]
4.	100	We don't necessarily offer for students to buy their own texts but students are assigned their own during the course semester.
5.	0	*No Response*
6.	0	*No Response*
7.	0	I would like to sell the text and workbook but school policy won't allow it.
8.	5	*No Response*
9.	1	Have bought their own.
10.	100	They can purchase their own texts if they want to. We have only one class set
11.	0	*No Response*
12.	100	They are assigned at the start of the course
13.	0	We supply the text
14.	None	We have the text books in our own classroom and this is where they stay.
15.	100	*No Response*
16.	0	*No Response*
17.	95	-No rental system, students share, borrow's, the instructor may photocopy the workbook assignments. [*Sic*]
18.	N/A	*No Response*

(table continues)

School no.	Percentage	Comments/explanation
19.	0	Parents/Division office are of the opinion education costs for non-acedemic courses are high enough [*Sic*]
20.	0	*No Response*
21	0	*No Response*
22.	75	Introductory Automotives use class sets
		Intermediate and Senior students purchase texts
23.	100	Compulsory.
24.	25	*No Response*
25.	100	*No Response*
26.	5	*No Response*
27.	0	*No Response*
28.	100	*No Response*
29.	0	*No Response*
30.	100	We don't use a textbook in Grade 10 but plan on purchasing Car Care Book / Bourassa
31.	0	*No Response*
32.	0	*No Response*
33.	*No Response*	?
34.	0	They wouldn't buy them for a course like mechanics. They won't even buy a three ring binder.
35.	0	*No Response*
36.	0	Books are on loan from teacher – not through book rentals

What percentage of students could possess their own textbook?

This question reveals that virtually all automotive programs in the province possess one class set of textbooks. This means that students in the automotive program must not take the texts out of the class because other students need these same texts when they are in class. In a typical core subject class such as math and English, each student

signs out a text and can do supplemental study or homework any time they see fit or when it is assigned by the teacher.

The cost of the automotive texts to the school is the main reason that students do not have their own textbook, but there are a few methods to ensure that each student has the use of a textbook. In most cases when a particular textbook is assigned to an individual student, the student takes care of the textbook because the student knows that he/she will be held accountable for damage, usually from the student's textbook deposit.

Many teachers simply photocopy the individual chapters of the textbook that correspond to the specific module/course on which the students are working even though this practice is not in compliance with copyright laws. Most of the current automotive textbooks have a *Student Workbook* and a *Teacher Resource Manual*, which are all excellent resources for students learning the concepts required in the automotive programs. Some schools have realized this, and each student rents a textbook and purchases the related workbook, which can be used for all three grade levels in the automotive program.

Some schools charge each student a yearly automotive user fee. The fee ranges from $25.00 to $60.00. In some cases, this fee includes the purchase or rental of shop coveralls, textbook rental, and the purchase of the workbook. As with other school user fees, it is not uncommon for students with financial difficulties to be assisted by the school to ensure that they have the same opportunity for success. Automotive programs that fund-raise will sometimes buy textbooks.

Table 25 and Analysis

Table 25

Were You Teaching the Older 10, 22 ABC, 32 ABC Program?

School no.	Response	Comments/explanation
1.	1=Yes	*No Response*
2.	1=Yes	Last year of the old program when I started
3.	1=Yes 2=No	#2 took CTS education with strand training a N.A.I.T. [*Sic*]
4.	1=Yes	*No Response*
5.	1=Yes 2=No 3=Yes	3 Teachers
6.	1=No 2=No 3=No	*No Response*
7.	1=No 2=No 3=No	Prior to my transfer to this school I taught 13 years at an I.O.P. school. Integrated Occupational Program.
8.	1=Yes	*No Response*
9.	1=Yes	Had 3 cr. Gr. 10 22AB 10 cr. Gr.11 32AB 10cr. C 20 cr. Gr.12
10.	1=No	*No Response*
11.	1=No	*No Response*
12.	1=No	*No Response*
13.	1=Yes	*No Response*
14.	1=No 2=No 3=No	All CTS modules
15.	1=Yes	*No Response*
16.	*No Response*	*No Response*

(table continues)

School no.	Response	Comments/explanation
17.	1=No	Just completed 1st year teaching
18.	1=Yes	This program, in my opinion, was much better than the current CTS strands. [*Sic*]
19.	1=Yes 2=Yes	We have been changed over completely to CTS since the 98/99 school year
20.	1=Yes	*No Response*
21.	1=No	*No Response*
22.	1=No	*No Response*
23.	No No Yes	Junior 3 teachers Senior 22 ABC, 32 ABC 1 Teacher.
24.	No	*No Response*
25.	Yes	*No Response*
26.	Yes Yes Yes	*No Response*
27.	Yes No	*No Response*
28.	Yes Yes	*No Response*
29.	No	*No Response*
30.	Yes Yes	I started teaching CTS courses from the beginning of my teaching career but wasn't fully implemented until 3 years ago. I have been teaching for 5 years.
31.	*No Response*	*No Response*
32.	Yes	*No Response*
33.	Yes	*No Response*
34.	No	*No Response*
35.	No No No	*No Response*
36.	Yes Yes	*No Response*

Were you teaching the older 10, 22 ABC, 32 ABC Program?

The significance of this question is that those respondents who said "yes" have been teaching longer than five years, since that was when the CTS curriculum was implemented. They have also seen both curricula and can comment on the advantages and disadvantages of both. Although this question was not asking for comparisons, some of the responses indicated the old curriculum teacher's perceptions that "this program, in my opinion, was much better than the current CTS strands" (respondent 18).

Any respondent who answered "no" to the question must have been teaching automotives for fewer than five years because of the date of the introduction of the CTS curriculum. Some of these respondents may have taught in other subject areas before the they taught in the automotive programs. Another possibility is that the teacher has been teaching integrated occupational program students and was using the IOP curriculum.

The data indicate that two thirds of the automotive teachers have been teaching automotives for longer than five years. Many of the respondents indicated they have been teaching automotives for 15 to 25 years, some even longer. The impression given was that many of the automotive teachers in Alberta are nearing retirement age. At this time there is already a shortage of automotive teachers in Alberta, and the situation will become worse as many of the current teachers retire. Replacing an automotive teacher is not easy because few of the remaining teachers are willing to move to a new school district because they will be placed on a one-year probationary contract. The risk for most of the veteran teachers who are close to retirement is too great, especially in light of the fact that some automotive programs are declining or closing. There are few university students currently completing courses at the U of A with journeyperson qualifications. Some schools have had to advertise countrywide, and which has proved to be a futile effort. A few graduates from Red River College in Manitoba have recently taken automotive positions in Alberta. Some districts may also try to hire a journeyperson mechanic and have them teach the program under a letter of authority from their

superintendent in collaboration with the Minister of Learning. The schools that have attempted this reported dismal results because classroom management skills and different educational delivery techniques are required with the types of students in the automotive programs. These non teacher-certified journeyperson teachers seem to work well at the college level with highly motivated adult apprentices, where they peer-teach with a senior instructor in classes with student-teacher ratios of 12:1.

Table 26 and Analysis

Table 26

How Would You Rate the Change-Over Process (From Previous Curriculum to CTS)?

School no.	E-A-P	Comments/explanation
1.	P	Each school has different equip. Modules have to be rewritten, Students like customer service if you give them shop cars they are vandalized.
2.	A	I don't really have anything to compare the transition to.
3.	A	*No Response*
4.	A	I believe that the change over was needed to "Standardize" the practical arts areas as much as they can be standardized. If teachers bought into the changes & processes at their introduction, it was positive.
5.	P	*No Response*
6.	AP	*No Response*
7.	P	I have found little help etc…in learning the module format, I have learned as I go. [*Sic*]
8.	AP	*No Response*
9.	P	We were one of the first to change over C.T.S.
10.	AP	Little or No extra money, materials and supplies, inservicing or student ready material. We were told Alberta Ed.- had set $5, million aside. Where is it?
11.	AP	Change hurts!
12.	*No Response*	*No Response*
13.	AP	We had a good program – I think Alberta Learning changed the program just for the sake of change
14.	A	*No Response*
15.	*No Response*	NonExistant

(table continues)

School no.	E-A-P	Comments/explanation
16.	*No Response*	*No Response*
17.	*No Response*	N/A
18.	P	The new CTS modules are a joke. There is too much emphasis on some minor areas (alt fuels) and neglect in important ones. (ex. Electronics)
19.	A	Tracking----#1 Problem Substantially More work for the teachers
20.	P	*No Response*
21.	*No Response*	*No Response*
22.	*No Response*	N/A
23.	EA	Many teacher putting in long hrs. to make it work.
24.	A	Good at our school --- However I still believe that to incorporate all requested modules we need a lot of extra money to purchase the required tools, etc.
25.	AP	Cirrculum needed up dating but most students sent here are not ready for self motivated Learning and lack self control to maintain active roll in program [*Sic*] I think that I have modified CTS program into 6 units & anyone who whishes to accell does so on his/her own. [*Sic*] The grad 10 make 6 credits easy 11&12 lucky to get 5 [*Sic*]
26.	P	*No Response*
27.	A	(Part of CTS team so have an advantage.)
28.	P	*No Response*
29.	*No Response*	Never taught it before
30.	*No Response*	I can't comment because the process had started before I started teaching in Alberta.
31.	AP	I found the change to be more of a "Title" or "Name" change rather than a concrete, visible change.
32.	P	*No Response*

(table continues)

School no.	E-A-P	Comments/explanation
33.	P	The government has not been supportive with the changes. Why fix, what was never broke! I believe the changes were done to satisfy urban school problems!
34.	P	We get little or no support in mechanics. It appears to be run by the old Business Ed. types.
35.	AP	*No Response*
36.	P	*No Response*

How would you rate the change-over process (from previous curriculum to CTS)?

This question captured a sense of the teachers' perceptions of the changeover process from the old automotive curriculum to the new CTS curriculum. The majority of the respondents have indicated that the changeover process did not go smoothly or that the transition is still in progress. The quantitative data from the survey indicate that 12 respondents rated the changeover to the new CTS curriculum as *poor*, the lowest rating on the Likert scale. The qualitative comments also support this view. Figure 2 indicates the five choices selected by the respondents.

The comments indicate that many teachers had to learn and adjust as they went through the process with little or no support (respondents 7, 10, 33). Some stated that they thought Alberta Learning changed to the new CTS curriculum only for the sake of change (respondent 13). Other teachers indicated that any change to the program curriculum is difficult for those involved (respondent 11). What may have helped the process of accepting the changeover from the old curriculum to the new one may have been in-service workshops, one on the subject of change and the other one on the dynamics of the effects of change on individuals and on the process that those involved will experience during the changeover process (respondent 33).

Although this question focussed on the changeover process, many of the respondents commented on the advantages and disadvantages of both the old and the new CTS curriculum. One advantage to the new CTS curriculum is that it is easier to add or

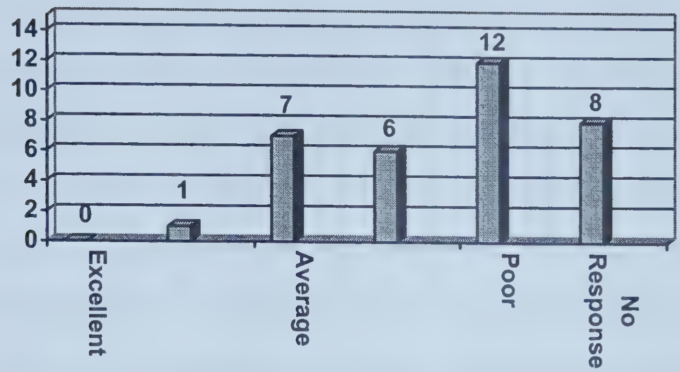

Figure 2. Rating of the change-over process (from previous curriculum to CTS).

drop a student because there are more opportunities during the year for this to happen. Schools that bundle a number of courses together have a problem when a student starts in the middle of a semester or if a student fails one of the courses in a particular bundle. The student may then have to take the entire bundle of courses over again, because the missing or failed course(s) may be a prerequisite for later courses in the school's flow chart of courses, or it may be one of the required apprenticeship-articulation courses. Alberta Learning will let schools bundle courses together and will fund students to upgrade existing courses and retake failed or missed courses that are a portion of a course bundle. The tracking involved with the new curriculum is many times more involved than with the old curriculum, and many schools continue to struggle with student-tracking issues (respondent 19). Most schools have indicated that teachers who have bundled groups of courses together have had greater success in tracking students through the program. If a student changes schools, an initial assessment of the courses, that he/she has completed and how to integrate these into a different flow chart of courses have proven to be very difficult. In some circumstances it has meant that the student has had to upgrade many already completed courses because the bundle method of course selection

was being used, and because many courses require a prerequisite either from Alberta Learning or for articulation by the Apprenticeship Board. See also Tables 17 and 18.

Some schools indicated that the shorter CTS courses do not work as well with customer service (respondent 1). The underlying theme is that the students prefer customer service, but the shorter courses do not always guarantee that sufficient customer service repair vehicles will be available during the specific course. The old curriculum was a semester long, and during that longer period teachers and students agreed that it was easier to have more quality shop time for customer service repairs. Some teachers indicated that they use the module/course flowchart for the theory portions of courses only. Once in the shop, students work on whatever customer service work that they have knowledge about. They might also work on part assemblies or shop cars, which pertains to the practical aspects of other modules/courses. In these situations student tracking is doubled, because teachers must track both the theory and the practical components separately.

An important theme from the comments of administrators, teachers, and school boards is that there are many subject areas within automotives, and many of the aspects concerning growth and decline are different for each one. Blanket statements about aspects of CTS should be carefully thought out, because there are many instances in which the underlying theme in the research of the automotive strand would have different results or the opposite effect in a different strand. This is partially due to the diversity of CTS strands, but also because of the unique features that are inherent in each specific strand. The colleges have experimented for years to reduce administration by grouping certain trades together, only to find that it cannot be done, and they revert back to individual departments. The high school CTS strands are similar here to those of the colleges in that only generic administrative meetings can be held with all trades and strand personnel present. An example would be a meeting about the open house, in which representatives of all strands can be present to organize an efficient and successful open

house. Although many teachers and administrators indicated that the CTS department meetings are almost entirely used to attempt to address individual strand concerns, it is for this reason that the colleges have been unsuccessful in reducing the administration of what they first envisioned as duplication amongst the individual trades.

Some teachers have indicated that the new CTS curriculum has poor student outcomes for some of the courses (respondent 18), and others have indicated that the old curriculum was too specific and therefore became outdated in some areas that had significantly changed. A prevalent view in the automotive strand is that the new CTS curriculum is very open to any updating that the teacher is willing to do. This, however, can cause concerns when a student changes schools and finds little or no continuity of course content.

As in the colleges, the problems of automotive professional development, automotive theory and automotive shop aspects, and the many automotive programming issues may be better dealt with by a school's automotive teachers than by the entire CTS department. This would be in contrast to having CTS department meetings in which too many diverse strands are represented. For example, automotives, cosmetology, fashion designing, welding, food preparation, and machining. The same-subject departments of colleges have attempted to liaise with those from different colleges and therefore meet only occasionally with all the other trades within that specific college to discuss the generic interests of all the trades, such as open house, advertising, students union. This has been mentioned by the Alberta high school teachers who have taught for many years, who were reflecting back in time to attempts to establish provincial wide automotive meetings. This idea was gathered while administering the initial pilot studies of the stakeholder groups. The high school teachers suggested that two to four meetings a year be held so that issues concerning the automotive teachers and the automotive programs could be dealt with by a united group. They also commented that it would be beneficial in facilitating change, because there would be a more unified voice and individual schools

would not have to work through similar issues independently. Educating stakeholders on the specific issues facing high school automotive programs was also suggested as another area for collaboration among the province's automotive teachers.

Participants in the initial pilot study agreed that there is merit to modeling this aspect of the college when discussing CTS strands in Alberta high schools. As in the colleges, the high school teachers and their administrators suggested that each CTS strand department should meet with the specific CTS strand departments from other schools and should meet less often with the different strands within their same school.

Table 27 and Analysis

Table 27

If You Were to Rate the Student Who Completed the Older ABC Type Program as 10, How Would You Now Rate a Student Who Has Completed the Three Years of CTS Modules?

School no.	___/10 approx.	Comments/explanation
1.	5	We are expected to create monies to support our program. Customer service takes longer than modules allow. There aren't enough module numbers. Students come into class expecting Shop -No Theory No Exams No Assignments You can apply theory in shop. Everytime you work with a group you end up giving a lesson to each group as you teach theory & its application. Hence students know less & more time is spent trying to do simple jobs. [*Sic*]
2.	*No Response*	N/A
3.	10	Depending on how many modules they have completed. Years mean nothing how many modules.
4.	15	I believe the revised CTS programs require higher standards of behaviour, knowledge and skills. Utilizing the modular approach forces teachers and students to focus on the MLE's of each module and ensure that they have been attained and mastered. [*Sic*]
5.	8	*No Response*
6.	6	*No Response*

(table continues)

School no.	___/10 approx.	Comments/explanation
7.	1	Due to timetabling, equipment and facility deficiencies I honestly don't think the majority of students have the skills or knowledge necessary to enter apprenticeship. However I have had the odd student enter into S.A.I.T. mechanics. Since I completed the older 22ABC 32 ABC Mechanics courses I feel I can accurately rate the two instructional methods. I honestly prefer the older method since I would have the students for 2-3 periods blocked together each day. I feel at the advanced level the modules are to complex. If I was teaching for student employability, basic skills, ethics etc…are what need to be taught, not, for example an ABS Brakes module. [*Sic*]
8.	6	The demands to pigeon hole content forces the learning process and strips important areas in many cases. Specifically machining work like drill press tops, ties, grinder. Engine work is poorly allocated time. Brake work becomes a trade off for time etc. The result is rushed teaching and C.E.U. counting. I believe delivery of content is sacrificed. If asked "do I like the overall concept as a whole?" Initially I said yes we need change, but now I feel we really have not made improvements to the program quality, make true all too many sacrifices for the sake of dollars.
9.	3	CTS does not give a student the hard skills that the old program offered. Many of the moduals [*Sic*] do not allow for practice of a given operation. Ie It takes more than one brake job to be good at that task. Without having CTR credits to use the engine rebuild section of the course is now 2 credits (50 hr) rather than 125 hr (5 cr). I used to have students go straight into engine shops now they star sweeping the floor! [*Sic*] Also CTR credits. There are not enough CTR credits for large CTS schools. I am limited to 1 or 2 for the 3 years (all levels) of my program. Staffing is a problem when it comes to large CTS course schools. Staffing set to acad. Schools applies to C.T.S. schools 21.5/teacher. This penalizes CTS schools + will push shops out of all schools. The old system did not work as the CBE. Kept all of the Tech. Grant money + put it into general rev. [*Sic*] [*School Name*] in [*Location Name*] was/is one of the few schools that receives all of its tech grant/C.T.S. money that it earns. [*Sic*]

(table continues)

School no.	___/10 approx.	Comments/explanation
10.	8 to 10	It depends a lot on how effectively the material is presented and received.
11.	6	*No Response*
12.	*No Response*	*No Response*
13.	*No Response*	The end result has probably not changed much because of program change but I believe the old program was easier to present and it was a lot simpler to teach.
14.	6	The automotive 12, 22ABC, 32ABC was taught when car technology was easier. The problem now is the vehicle has become so technical students can not master the new vehicles. I believe our job here in the high school automotive is to give the student an introduction to motors vehicle basic principles. Problem here is the old cars, which the student could have success with due to its simplicity, and now having major difficulty understanding the new vehicles because the newer vehicles have a way higher technical base than the older cars. You can design CTS modules to cover certain topics but 25 hours is not enough time to master the topic. [*Sic*] Second problem is: most students today do not work on their own cars because they can not afford to drive one. Due to maintenance cost and insurance. Also high amounts of dollars needed to purchase equipment. I believe the high school automotive program in the high schools will reach a point, where the vehicle will be too technical for students to master and the CTS Automotives will be shut down. The colleges will then offer a two year program and teach students from the beginning to advanced levels. At this time, the automotive teachers are a general mechanic. They know a lot about everything. The mechanic technician today must be a specialist and focus on one thing. As an instructor I can not keep up with all the different makes and models. Also the students are here to learn a bit of theory but very few are going out to the automotive trade as a vocation. Thanks. [*Sic*]
15.	1	*No Response*
16.	*No Response*	*No Response*
17.	*No Response*	N/A

(table continues)

School no.	___/10 approx.	Comments/explanation
18.	4	The course seems "Mickey Mouse". I can not teach according to these CTS modules so I lock the students into taking 6. This is the only way to manage the teaching. [*Sic*] The entire CTS experiment is flawed. In theory, the students should be self motivated and willing to learn on their own. In my experience a more regimented style is more successful. This program needs to be re-evaluated otherwise very few automotive teachers will be able to survive.
19.	*No Response*	Old 12/22ABC/32ABC = 10 MOTIVATED CTS STUDENT = 8/10 AVERAGE CTS STUDENT = 6/7 UNDER AVERAGE CTS STUDENT = ¾ DON'T FORGET WHEN YOU TEACH A COMBINED CLASS OF 6 IIA STUDENTS 7 IIB STUDENTS 1 IIC STUDENT 1 IIIA STUDENT 6 IIIB STUDENTS YOU REALLY DON'T TEACH, YOU FACILITATE STUDENT LEARNING, YOU SATISFY DIVISION OFFICE, YOUR ADMINISTRATION, YOUR PARENTS, YOU SURVIVE! YOU RETIRE! YOU BECOME A REAL PERSON AND LIVE HAPPILY EVERAFTER!! [*Sic*]
20.	4-5	They do not get the hands on experience of the old program. When Alberta Ed asked for input in to the development of CTS Auto they only wanted teacher who agreed with their ideas. I did not agree and was not asked for further input. [*Sic*] For the 20 years I have taught Auto the same questions + answer have been found to make Trades training in high school work. The will to make it happen does not exist in Alberta – to do so would mean the academic community would have to admit most do not go to University and focus the advertising for school on reality. Maybe then students would not be made to feel like failures because they don't attent UofA. [*Sic*]
21.	?	*No Response*

(table continues)

<table>
<tr><th>School no.</th><th>___/10
approx.</th><th>Comments/explanation</th></tr>
<tr><td>22.</td><td>10</td><td>CTS modules are specific in the theory and text work. However, the shops are still set up as vocational job oriented work or learning center.</td></tr>
<tr><td>23.</td><td>5</td><td>Many students do not have time in their timetable to make commitment.</td></tr>
<tr><td>24.</td><td>6-7</td><td>Not a real flow to the courses, class size has significantly reduced the effectiveness of the program.</td></tr>
<tr><td>25.</td><td>No Response</td><td>Mech 10 = A 22 B 32 A = 10
22 B 32 B
22 C 32 C
<table>
<tr><td>if</td><td>1020</td><td>2020</td><td></td><td></td></tr>
<tr><td>3</td><td>1040</td><td>2030</td><td></td><td></td></tr>
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1010
<table>
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<tr><td>MEC 1010</td><td></td><td>0</td><td>MEC 2020</td><td></td><td>0</td><td>MEC 3010</td><td></td><td>0</td></tr>
</table>
Only 1 to 3 students a semester complete full run and have had several more each semester that do not take 10 credits career transition 5 to 6 semester [Sic]</td></tr>
<tr><td>26.</td><td>7</td><td>No Response</td></tr>
<tr><td>27.</td><td>8</td><td>Given time this will improve.</td></tr>
<tr><td>28.</td><td>4</td><td>No Response</td></tr>
</table>

(table continues)

School no.	___/10 approx.	Comments/explanation
29.	*No Response*	N/A
30.	*No Response*	Again I am unable to comment on this.
31.	*No Response*	Not applicable.
32.	6	*No Response*
33.	5	Completion is on thing! Competency based is another! My students are not anymore successful with the CTS program as compared to the AB 12-22-32 (customer service suffers!) program! What a waste of money, again from the Alberta Government! I truly hope, that your rationale has merit. If all that comes from this survey is your PhD, what a waste of my time! P.S. I enjoy teaching automechanics, and have a supportive administration! The government has made a mess of the education system. Class sizes are too large in academic courses and the elementary system. The private system is definitely looking better all the time! P.S. P.S. I'm not an old, crazy I.A. teacher, just an caring, honest teacher, looking after the needs of my students!
34.		We have never offered Automotives so I won't compare. We always offered Ind. Arts or Ind. Ed.
35.	0	*No Response*
36.	4	I teach gr 10 & 11 and in the two 3 credit courses I offer – by the end of the 6 credits at our school – the finishing gr. 11 did not get the depth I used to offer in mech 12 – now we offer 3 credits in 3 grades with extra options in gr 11 & 12 and very very few are taking the deeper courses, yet we DO SEND good students to SAIT & OLDS College for H.D., AST, AGMECH & AIRCRAFT – sure would be nice to offer depth here. [*Sic*]

If you were to rate the student who completed the older ABC type program as 10, how would you now rate a student who has completed the three years of CTS modules?

The significance of this question is that it summarizes the teachers' perceptions on the competancy of the student who has completed the old curriculum versus those who have completed the new curriculum. The lowest rating was 1 and the highest rating was 15 out of 10. One respondent thought that students who complete the CTS modules are clearly superior to those students of the old curriculum. The average rating was 3.8 out of 10. The initial pilot studies of the various stakeholders also indicated that the new CTS curriculum has been and will continue to be a significant factor in the decline of the high school automotive programs.

Some teachers who were first consulted on the development of the new curriculum stated that they knew of the college's failed attempts at modular instruction in automotives. These teachers suggested that more research be done. Their later suggestions were not desired (respondent 20). Teachers in different subject areas of CTS were asked to provide input into the new curriculum as it pertains to their individual subject areas, but the majority of the curriculum developers appeared to be developing curriculum strands in which they did not have journeyperson status or teaching experience. Some teachers commented on this as being the place at which developmental mistakes first began. It has become accepted that the different strands of CTS require different sequencing and method of instruction, and only those with appropriate knowledge in the specific strand would be the best choice to design curriculum that would be sensitive to these differences. This is also a reason why some of the teachers' input seems so different from some of the other strands' teachers. This may give the impression that some of the automotive strand teachers were rigid and going against the direction of some of the other strands. Some automotive teachers commented that they believe that they were being labeled as rigid teachers who simply did not want change.

While interviewing CTS the curriculum developers of Alberta Learning and the CTS consultants it was conveyed that some of the curricula was quickly developed for some of the strands and that the automotive strand was one of these. The assumption was made that that competency-based modular learning was going to be the best for curriculm. Only a few individuals were involved in the curriculum development of the automotive strand. They could not spend much time if any researching individual strand methodologies from other institutions that had already experimented with competency-based modular learning. The focus of the developers was on the modules, the sequence, the tools and resources required for the school to decide whether or not to offer the particular module. Some of the curriculum developers of Alberta Learning commented that the deadlines for the various modules were only days away, while several months had passed in the attempt to develop the necessary modules for the automotive strand, with little success. Then, with the push of the deadline, it would be completed in the last few days, and these same developers would have to begin developing the next strand assigned to them.

Many of the stakeholders which included the teachers, administrators, The Alberta Teachers' Association, parents, apprenticeship personnel, Workers' Compensation Board and the Alberta college personnel suggested that the modular approach to teaching automotives has failed, and one of the main reasons is suggested in the comments of respondents 1 and 19:

> Every time you work with a group you end up giving a lesson to each group as you teach theory & its application. Hence students know less & more time is spent trying to do simple jobs [*Sic*]. (Respondent 1)
>
> You don't really teach, you facilitate student learning, you satisfy division office, your administration, your parents, you survive! You retire! You become a real person and live happily everafter!! [*Sic*]. (Respondent 19)

These statements suggest that the teacher must now teach the concepts many more times to the same number of students. Teaching the concept once and then occasionally refreshing the memories of students is a more efficient method of delivery. In a self-

paced methodology, the teacher must teach the same concept many times without the advantage of a structured theory class/lab demonstration to accompany it. The individualized delivery of each concept is more personal because of a lower student-teacher ratio of the small shop groups. The teacher is now working without teaching aides, a lesson plan, and, most important, the time to best reach the many types of students who take these vocational types of courses. Nova Scotia Community College has also recently attempted to use a competency-based modular approach in automotives, which has failed, and they have returned to the lab-demonstration method with note taking and all the students participating in the lesson at the same point as well as having all students take part in group lab demonstrations . George MacLean, who is the Board Chair for the Apprenticeship Board of Nova Scotia and the past Director of Trades and Technology at the Nova Scotia Community College, pointed out in a letter dated November 10, 2000 that modular competency-based instruction in automotives does not work:

> Everyone starts at the same point but you quickly have people advancing, people who are average and those who are quite slow. So in a very short time if you have a class of twenty, you can quite literally have 20 different programs going on. With a lot of people at different levels the Instructor can no longer instruct, rather he/she becomes a facilitator (Translation—Instructor becomes like a traffic cop at a busy intersection, can only point students in the right direction, hand out learning resources, videos, tests etc. and usually spends more with paper and administrivia than he/she does teaching). . . . Morale will definitely suffer because the instructors will know that this is not a good way to teach any trade. In my 25 years experience, it is my opinion, which is shared by most people I talk to that the average apprentice must be, and wants to be, taught. (p. 1)

This illustrates that the instructor/teacher becomes too busy with the result of impaired student learning. It appears that competency-based modular learning has not been successfully accomplished in automotives anywhere in Alberta. This is not to state that it could not be successful, but virtually every school in the province that has an automotive shop was visited for this study, and the majority of teachers stated that the

older curriculum had a better delivery method. Most teachers stated that they could plan for a variety of learning strategies to have the students understand the concepts to be learned as a group. This method has greater success at keeping all the students on task and the teacher has the benefit of preparing a demonstration and lab only once to further enhance the understanding of the concepts. Student racking is also made easier.

No research was found on successful implementation of competency-based modular instruction in an automotive setting, and no school was found that could be a model of how to incorporate competency-based modular learning in automotives. There were other subject areas in which both research and clear models of success could be found; for example, in the subject area of computer technology in which one teacher could have 30 to 40 students working at their own pace and still have time to discuss with me the success of the computer in keeping the students motivated and on task. Some of the computer teachers stated that they could increase their student-teacher ratio to an estimated 60:1 using the competency-based modular learning format. These computer teachers suggested that when they had 25 computers, they could easily handle 25 students; and as their computer labs grew to 40 stations, with each student having a computer, it was discovered that 40:1 is still manageable for a successful program. Many of the computer programs are also self-grading, and some guide the learner to the next module when the prerequisite has been completed. Having witnessed a number of schools' computer classes in which they have successfully incorporated the new CTS curriculum, I realized that generalized statements concerning CTS should not be made. Rather, individual subject areas should be researched and studied to determine which curriculum delivery methods best help student learning and contribute to the success of the particular CTS strand. It would be helpful to find a school/class using competency-based modular learning in which success is clearly evident, which would prove to stakeholders that the success of the program is indeed attributable to using the

competency-based modular approach. The teaching, learning, and administrative aspects of the program could then be duplicated in other schools/classes to foster success.

What must be realized is that the Apprenticeship Board has stated that our province has a shortage of apprentices as well as a shortage of journeyperson mechanics, yet there is little being done to supply communities with these tradespersons. It was reported in the literature review that most of the unemployed people in our country have not completed secondary schooling. Some of the students in the automotive programs attend only because of the program's popularity. However, the new CTS curriculum does not appear to be as satisfying to all the stakeholders, including the students. Any relevant life skill such as being able to understand and possibly repair their own automobile may be reason enough for schools to realize the importance of the program to the community. Because some automotive teachers come from a strong industry background, there has been talk of starting a private automotive program to better serve the students. Suggestions for this new private school include a curriculum that more closely emulates that of the college, and leasing equipment to minimize expense. Work ethic is considered a key factor in promoting the student to the next level. Although this may sound idealistic, both NAIT and SAIT have stated that employers are still demanding a good work ethic as one of the key factors contributing to the success of the apprentice. By providing sound educational experiences, the teachers of the schools can better instill the values of work ethic and general citizenship. As school programs deteriorate, it becomes harder for the teacher to teach, share, and become a positive role model. The students of a poor program are less likely to continue with the program and therefore are probably less likely to continue as apprentices. For the students who do, teachers' role modeling in the high school automotive program becomes very important.

It seems that chartering a private school in Alberta is becoming easier than ever, and with the number of private schools growing at an astonishing rate, it may be only a matter of time before the first private automotive school opens. Alberta now has 17% of

its schools with their own private charter, up significantly in the last 10 years. Considering the funding of Alberta Learning for each credit and parent-funded subsidy of $100.00 per month provides a financial breakdown for an automotive shop with two teachers with full-time assignments for the year:

School revenue for each credit	$120.00
Students in average-size class	X 18
Full day classes in which two teachers will provide instruction	X 4
Credits that could be earned by each student	X 24
TOTAL =	$207,360.00
Parent subsidy of 72 students	
X $1000.00 tuition	72,000
TOTAL:	$279,360.00

It must be noted that the schools' budgets mirror the district's budgets in that they spend 80% to 85% of the total income on salaries and benefits to the teachers, administrators, and support staff. Most districts reported an average estimated cost of $57,000.00 per teacher per year for salary and benefits.

There are many idealistic charter schools being started by parents who want their children to have relevant life skills that can be transferred to the world of work. For example, Edmonton now has a hockey school where students spend one third of their school time in the pursuit of hockey knowledge and skills training. These types of schools are sometimes becoming part of the public school boards since the public boards are realizing the drawing potential. There are also religious denominational schools. Parents want the assurance that the school possesses the ideals of ethics and community and will have potential employers take note that the individual has successfully

completed a course in the chosen specialty. The employer can call for references and can speak to the teachers in those specialties. Anyone can verify that if the student has been successful in the school, then that student will likely have a high rate of success in the specialty because the school environment models the ideals of the specialty so closely. The students and parents are willing to pay and are becoming more interested in schools that promote themselves and as a result give the their graduates an advantage. The private school must guarantee that the higher standards of private school will be attained by the student on a consistent basis throughout the year in relevant demonstrations of the student's performance. Examples of these private school demonstrations are hockey games for the hockey school, public toastmasters for the ESL students, and repair competitions and automotive and motorcycle race programs for the envisioned automotive private schools.

Some teachers suggest that stakeholders understand that university is attended by only a small percentage of the population. Many teachers suggest that the CTS strands have the stigma of being less desirable than more academic professions (respondent 20). Like most of the respondents, this researcher hopes that the three-year study of the factors that affect the growth and decline of Alberta's high school automotive programs will be noted by those who can implement amendments to the new curriculum. Many of the respondents suggested that no one who has knowledge of the other automotive programs throughout the province or the collection of data on their program has visited their automotive program. Almost all of the teachers were very interested in the teacher perception survey and shop observation survey and how the automotive programs would compare throughout the province, because many of the teachers have spent little time visiting other schools' automotive programs.

CHAPTER V

QUALITATIVE AND QUANTITATIVE RESEARCH METHODOLOGIES IN AUTOMOTIVES CAREER TECHNOLOGY STUDIES

Introduction

One significant aspect of researching automotive programs is the task of how to evaluate the complexities of a successful or unsuccessful program. There is also the question of how to research successful or unsuccessful programs and what the findings concerning either can offer to the school, staff, and students. It has been suggested that an observing researcher usually cannot tell you all the particulars of a smooth-running shop environment, though they know a successful shop environment when they see one (Creswell, 1998). This is probably due to the numbers of variables involved. Attempting to identify and categorize each single element into two categories, one being successful programs and the other category being one that suggests that the element has a negative effect on the program, is difficult because the whole environment is greater than the sum of the individual yet more easily measurable elements. The researcher observer may describe *successful* as simply a general statement that suggests that all those involved in an automotives program are experiencing what appears to be a harmonious operation and that when students travel to automotive types of competitions, they generally do well. Other indicators may simply be that the customer service work is appreciated, and the vehicles are repaired. Though further explanations and definitions will be discussed, there are extensive discourses on virtually all aspects of research in general. Here the researcher desires to show what methodologies and trends have brought about CTS automotives.

Education is constantly evolving, and the changes that are taking place are often assumed to be based on some kind of information that is thought to answer a particular problem (Fullan & Stiegelbauer, 1991). It is this process of identifying the problem or

establishing that a problem or questions exists that is essentially what research is all about. The automotive programs in Alberta's high schools rarely experience evaluation or any of the different research methods that could assist all those involved with the programs to better understand the programs and how they fit it into the school's, board's, and students' experience.

A Brief History of CTS Research

The history of this research is common to most methodologies used in other subject areas over the years. The quantitative realm of designs or methodologies is what researchers commonly have used to collect and arrange data for the purpose of answering research questions. Alberta Learning's past CTS curriculum design individuals stated that surveys, experimental methods, and quasi-experimental methods were the instruments of choice. This follows the ideology that research is rooted in scientific question and the belief of accepting the laws of science as fact or "truth." *Concrete* and *provable* are words used to describe the past quantitative approach to research in the CTS areas. There are a few teachers in this area who have written a master's or a doctoral thesis on the history of CTS and the earlier vocational program. Little has been written on the history or the methodologies used over the years, though one can infer substantial information about the policy changes and see the results of curriculum revision which would have had to come from decisions made from Alberta Learning. From the early part of the twentieth century, research in general has been quantitative. This was also true in vocational education. Until the 1970s educational researchers would collect data in the form of numbers or would statistically organize actions as outcomes to represent a number that could be used to prove that responses to questions were correct.

CTS Research of Today

Current published research on the CTS curriculum is almost nonexistent. At the same time, educational research in general has shifted from the more traditional quantitative methodology to popular qualitative methodologies. It is important to consider that the methodologies can be used together and can be used to support each other. This sort of triangulation bolsters validity for the data and methods being used.

The 1990s experienced research shifts that suggest that there are new ways to ask questions and new methods to obtain findings and to develop conclusions. This decade has also been labeled as the decade of context validity, suggesting that researchers have placed more importance on the margins of how the data were collected and how the data were interpreted.

To better understand the significance of modernity, the passing of time to postmodernity, and the implications for research, one should understand that the idea of truth is central to the shift. In the past a scientific view of research was used that accepted the truths of science. If the laws of science were used, the outcomes and assumptions must be correct. The postmodern researcher questions the truth of the laws and of science as "Whose truths?" The postmodern view is to question Western-colonial ways that we as a society have accepted. Today's researcher can collect data in nonscientific ways but are nevertheless as rigorous and present the data in different ways that are scientific but, like the Western ways, may not necessarily be valid. We can understand nonscientific ways of conducting research that is valid by the example of data collection through conversations with teachers about how they view teaching today versus 20 years ago. The conversations could be collected, analyzed, and arranged to present answers to questions of how teaching has evolved and the overall feeling that teachers have about the evolution of their profession. To attempt to do this in a purely scientific way might have the teachers respond to questions with yes and no responses. The validity of measuring the teachers'

responses using such methods can pose the questions of how valid and reliable is the data. The researcher wants to find out how the teacher feels about the differences in teaching 20 years ago compared to now. The participant's recollections may not be accurate, or they might provide the researcher with the response that they believe the researcher wants. The method of simply collecting conversational interviews and the researchers' summarizing the overall feeling could have its own problems of validity and reliability. The teachers may be remembering facts differently than the actual way they took place, or the researcher may interpret the teacher's conversations differently from what the teachers meant. The conversations may have a more meaningful way of having others understand how teachers feel about the past than the more scientific method of tabulation simple responses to yes or no questions. The methods described as scientific are of the quantitative methodologies, whereas the research methods of seemingly nonscientific processes are of the qualitative methodologies. Figure 3 is a diagram that lays out the area of separation and togetherness of the two methodologies.

Meanings for some of the terms in the above diagram may have changed over the years as the evolution of research has taken place. Below is a list of the terms and a brief explanation of each.

Action research: This is a qualitative research methodology that has a defined set of parameters within which the research must be conduced. Another main aspect is the cyclical model of defining the problem, taking action about the problem, observing the results of the action, reflecting on the process thus far, and determining whether more "spiraling-down" is required to answer more questions. This methodology continues to spiral until the researcher has determined that there is no need to continue.

Content-analysis: This is a method of studying behavior by analyzing writing or verbal or visual communication and then categorizing it.

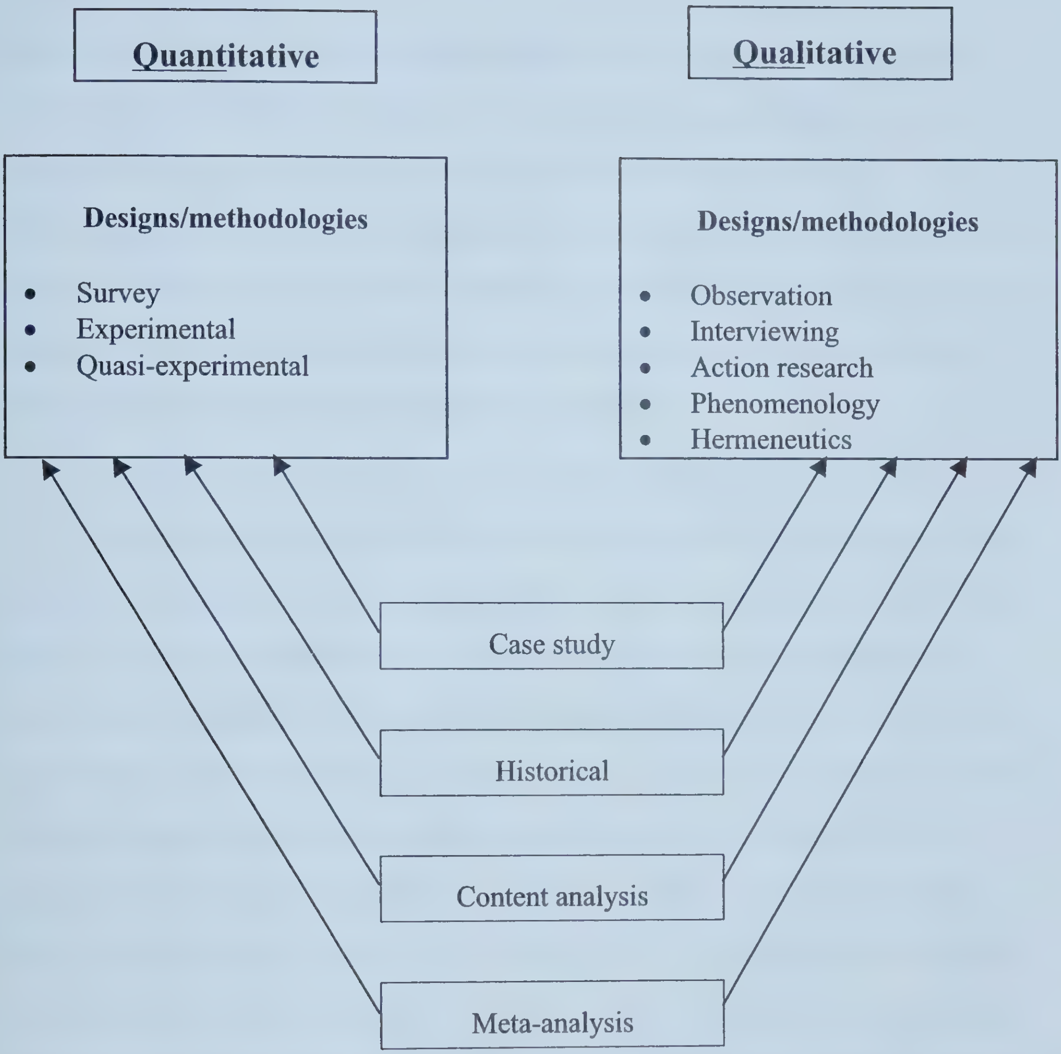

Figure 3. Methodology designs.

Experimental research: This is quantitative methodology that discusses the manipulation of at least one independent variable to have an effect on one or more dependant variables.

Hermeneutics: This is a qualitative methodology that discusses the interpretation of lived experience, the idea that each person may interpret the experiences differently.

Narrative: This is a qualitative methodology that values the spoken word.

Meta-analysis: This is a study combining the results of several studies on the same topic.

Phenomenology: This is a qualitative methodology that discusses the issues of lived experience. The idea that each person has experience and it is real to that person and therefore may be valid as data if collected by a researcher.

The New Jargon and Meaning of Postmodernity and Deconstruction

The new theories that were prevalent in the 1990s were of the idea that we have outgrown modern times (pre-1985 approximately) and now are contemplating a different lifestyle. We might think that with all of the technology we possess, our lives will become easier, and that we will find answers easier to the questions we ask. In fact, our lives have become more complex and busier, questions are still being asked, and answers still being sought. Some theorists might suggest that it is the technology itself that is responsible. The deconstructionalist view of educational theory is not based on going back to the good old days. The meaning of deconstruction is a postmodern idea that is to analyze critically, but in a somewhat cruel way, because to deconstruct is to tear the text (ideas, theories, and past truths) apart and not offer any possibilities for how to repair its faults. The hegemonic (a process of predominant practices and methods that we hold in our minds as representing the reality of being human) implications of this idea in education go against many of the master narratives (the assumed professionals) that suggest that no feedback or negative feedback is undesirable and has a negative effect on the learner. The postmodernist would suggest that a student receiving negative feedback

could still learn from it. The deconstructionalist may even suggest that the learner might gain different and possibly more insights from this method. They would further suggest that "On whose statement are we relying for truth?" is the belief that all students learn better by receiving only positive feedback as opposed to no feedback or negative feedback. The idea presented of positive feedback was one of assumed belief. This is an example of foundationalism. Postmodernists are not believers in the foundations of the facts, because they question all knowledge. The relevancy, correctness, and validity should not be used to establish truth, if one assumes that there is a "truth." It would only then become a question of whose truth.

The idea of deconstructing the existing curriculum becomes one of reworking many of the accepted givens or "truths" as we have come to perceive them. We know that perception can change, so it seems reasonable that by deconstructing the text, we may get those insightful sparks that let us further evolve or spiral down other paths to further unfold the textual tapestry around us. As researchers we read and study the discourses that we can find. We are also most likely to search out those individuals whose works are accepted by the same individuals whose purpose it is to deconstruct any text that involves the escape of the traditions and the usual acceptance of the accepted. The meta-narratives have usually become so by the adoption of discourse (widely accepted writings and theories on the topic) as having validity or an established truth. Banks (1988) was critical of grand theories because

> researchers usually feel obligated to interpret their findings in ways that will support their theories. The theory must remain intact, . . . [and] findings are described in ways that will fit the theory. This often results in descriptions of events and situations that are extreme, and that are characterized by an inattention to details that the grand theory does not explain and by explanations that are incomplete or misleading. (pp. 149-150)

To deconstruct properly, we have to ask why is it important to the narrator to write the discourse. To do this is a traditional sign of disrespect. If we could all

understand and then adopt "deconstruction" as a methodology of inquiry, by accepting new insights through different methods, the master narrators and others would be able to research and present data in ways that would not be viewed as disrespectful. This may cause the "powers that be" to lessen the protection of their authority, creating a more cohesive and open setting for educational change.

The Audience

Researchers may consider their audiences. The researcher may use different words or explain this or different theories to have the intended audience better understand. The researcher may also choose writing styles with certain flair for the dramatic or humor for an audience and other writing styles for other types of audiences. We can understand why this may be the case. Why would the assembly instructions for a child's toy be the same as the blueprints for the same toy? The millwright would laugh at assembly instructions because they would lack important details of the fabrication. The family would not want large sheets of opaque paper with all the detail of blueprints. This is an example of why the researcher must determine who the audience is. Is the audience fellow peers or a grants committee? The approach and presentation method of the same data might have to be quite different to grasp the audience. The recent past history suggests that it is becoming more acceptable for researchers to choose audiences and write for each audience differently. Here the audience could be viewed as the student and the teacher as the researcher. Taubman (in press) stated that teachers need to have proximity to student(s). Taubman's meaning is that a teacher could ask himself or herself the question, "Who am I in relation to these students or this student?" This "proximity" attempts to imply an ethic and social questioning that may help to understand the exchange of "goods" when viewing society as a consumable one with the essentials of bartering power.

Taubman (in press) spoke about the desire of the master to have students who do not know the subject area so that the master can convey his expertise to the learner. Researchers also want the audience to be able to use their results to benefit students and any of the other stakeholders.

As research is intended to answer questions, it should also be in a format in which the intended audience understands the language and diagrams. It should also be of a nature to allow the audience to feel or not feel the researcher's proximity to the research. This proximity could be viewed as the researcher's bias in an informal writing, whereas in a more formal dissertation, a specific part of the research would include a chapter on the biases and the possible theoretical implications of those biases.

The audience must be catered to if the research is to be meaningful. An example of this would be if a researcher were to suggest that interviews take place with teachers until the interviewer reported that the information gathered began to sound like a tape-recorder, indicating that the teacher for the most part was giving the same personal accounts. In a formal dissertation the term *sampling saturation* would have to be clearly defined to be meaningful to the ends of what the defense committee hearing a dissertation might expect. Researchers usually attempt to instill change with their research to one audience while attempting to write and use methodologies that may not be completely suitable for the audience they suspect will be most likely to be reading the research. The implications are significant for researchers, because they may have to adopt different ways to represent the same data to have a better effect on the audience who may need the research to answer a particular problem. The acceptance of different ways of collecting data may also benefit the audience if the audience has particular ideas of collection methods. Here is where the acceptance of "difference" and the deconstruction and postmodern differences may or may not support the different audiences, though most of the relatively new methodologies do support the ideal that "different" may be more acceptable than once thought.

The evolutionary process of refining or changing research takes on new and heightened meanings when the boundaries are expanded, allowing for wider margins. Storytelling and joking with audiences, for example, may work for some research and researchers. Some may use storytelling and joking as an intrinsic part of knowledge delivery rather than as a supplement. Clermont Gauthier's (1992) model of action research in his article named "Between Crystal and Smoke Or, How to Miss the Point in the Debate About Action Research" is a postmodern methodology of research. Spiraling, planning, and replanning may be the way to move a research finding from one time (now) to another (future) or from one audience to another. Our research methodologies are constantly changing. Older, established methodologies may become less demonstrated (not usually obsolete), whereas new methodologies breathe a heightened respect and more easily substantiate the value of change. Research, as with technology, seems to be grounded in the belief of "continuous" development as a meta-narrative.

Future Directions of Investigation

Whether one views quantitative and qualitative methodologies as being that different from each other after all the academic dust settles, we are still faced with the future openness of how we can research. The existing shift to a more qualitative realm of methods gives the future of research a sense of mobility to explore the possibilities of changing curricula. The postmodern deconstructionalist researcher can use various methodologies to triangulate the data to support the questions being asked. The following is a story in which the narrator (Prichett, 1996) suggested the possibilities of exploring different methods of "considering"[1] as a means to different results:

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[1] The word *considering* is being used here with the meaning of a postmodern deconstructualist frame to mean that the ability of knowing is important; however, the differences of knowing between student and teacher, audience and researcher may not be one of knowing more or less but of knowing differently. Many CTS educators have expressed this reoccurring phenomenological theme in different communications over the course of time.

> I'm sitting in a quiet room at the Milcroft Inn, a peaceful little place hidden among the pine trees about an hour out of Toronto. It's just past noon, late July, and I'm listening to the desperate sounds of a life-or-death struggle going on a few feet away.
>
> There's a small fly burning out the last of its short life's energy in a futile attempt to fly through the glass of the windowpane. The whining of the wings tells the poignant story of the fly's strategy—*try harder*.
>
> But it's not working.
>
> The frenzied effort offers no hope for survival. Ironically, the struggle is part of the trap. It is impossible for the fly to try hard enough to succeed at breaking through the glass.
>
> Nevertheless, this little insect has staked its life on reaching its goal through raw effort and determination.
>
> This fly is doomed. It will die there on the windowsill.
>
> Across the room, ten steps away, the door is open. Ten seconds of flying time and this small creature could reach the outside world it seeks. With only a fraction of the effort now being wasted, it could be free of this self-imposed trap. The breakthrough possibility is there.
>
> It would be so easy.
>
> Why doesn't the fly try another approach, something dramatically different? How did it get so locked in on the idea that this particular route, and determined effort, offer the most promise for success? What logic is there in continuing, until death, to seek a breakthrough? with "more of the same"?
>
> No doubt this approach makes sense to the fly. Regrettably, it's an idea that will kill.
>
> "Trying harder" isn't necessarily the solution to achieving more. It may not offer any real promise for giving what you want out of life. Sometimes, in fact, it's a big part of the problem.
>
> If you stake your hopes for a breakthrough on trying harder than ever, you may kill your chances for success. (n.p.)

With the deconstruction of the existing research, methods of curriculum development may be another way to gain insightful advances and ideas of the limitless possibilities that do exist for students to learn what is desired from schools and what is desired from the students. The idea that a quantum leap to a solution may be possible by not thinking in the usual ways or by trying harder is spectacular. This deconstructed view would have teachers and students trying different ways or creating different environments for learning the skills and attributes that are most like what journeypersons require to repair vehicles in acceptable or unacceptable fashions. This might mean smaller classes, academic standards of entry, gender-sensitive curriculum, and students' focus on

competition vehicles as a means of instilling the discipline of preparation, anticipation, and estimation. The research would simply have to frame the question and then choose or invent a new methodology to go boldly where no other researcher has yet to travel. The fact that the discussion may exist and have to be accepted as research may lead to changes that we have never thought possible. The future may be riddled with new acceptance of experimentation (or should I suggest the postmodern word *inquiry*?), because the old methods have consistently given us the same answers, the ones that we should have re-researched on our own and in different ways. Just to see.

CHAPTER VI

POSTMODERN IMPLICATIONS FOR AUTOMOTIVES CAREER TECHNOLOGY STUDIES

Introduction

Virtually all of the stakeholders involved with the automotives trade agree that there is a need for automotive education programs at the high school level. The main reasons are the immediate economic need for apprentice mechanics in Alberta and the popularity and relevance to students. The popularity stems from the fact that road-going vehicles are a major part of our lives and one of the largest industries in the Western world. Therefore, why would there be so little curriculum discourse?[2] Schools want and require information so as to be informed about this popular and expensive program. The answers to these questions are complex because of the scope of the trade and the aspects of delivering this career and technology studies program. The objective of this chapter is to explore the trade curriculum in a postmodern[3] way as a deconstructed[4] text and to foster an interest in postmodernism and deconstruction as philosophical terms. This may lead to a better understanding of past, present, and possible future directions and considerations of the automotive curriculum in Alberta high schools.

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[2] *Discourse* is all that is written and spoken and all that invites dialogue or conversation. Discourse even promotes its own reformulation.

[3] *Postmodern* is a term used to describe a time after the modern period of history. The postmodern time is believed by theorists to be after the mid 1980s. *Poststructuralism* is a kind of thinking, not a time period, that grew largely in France which, among other things, rejected many structuralist assumptions; hence poststructuralist. It seems that postmodern technology has become so vast in scope for the past structuralist that we assume now that information on the constantly changing technology is the most important factor.

[4] *Deconstruction* is a postmodern method of analysis. Its goal is to undo all constructions. Deconstruction tears a text apart and reveals its contradictions and assumptions; its intent, however, is not to improve, revise, or offer a better version of the text.

A Brief Trade History

The history of and the passion for automobiles stems back to the beginning of the century. Most of the stakeholders involved with the automotive trade such as the parents, industry, teachers and the apprenticeship board conceded that there was and continues to be a need for high school automotive programs and that there has been a consistent need for apprentice mechanics in Alberta. The stakeholders further suggested that the high schools greatly inspire students and make them aware of the possibilities of being future automotive tradespersons. This awareness usually leads to apprentice positions being filled to meet the demands of industry.

The early 1960s had high school curriculum developers model the successful automotive educational programs after those in the colleges and universities throughout Alberta. The high school programs received a large amount of financial assistance, both federal and Provincial, because vocational education was deemed a necessary product for Canada's and Alberta's future and therefore worthy of investment.

The past discourses in modern curricula spoke of vitality, which emerged because the culture of the day was to play with fast cars and to be creative by modifying them. These were the times when mechanization seemed to be the logical and sequential step to discovering the answers to improving our lives and society. This time bordered on the foundational[5] realm. All automotive teachers were journeypersons qualified and fresh out of university, and most had hobby interests of automotive restoring or racing. Virtually all of these same teachers are still with our programs today, but their connection to students and automotives has become dated, because few have ever upgraded in the trade to remain current or enrolled in university to explore the evolving theories of pedagogy.

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[5] *Foundationalism* is an attempt to ground inquiry or thought on pregiven principles assumed to be true beyond "mere belief or unexamined practice." Postmodernists are antifoundational. They contend that "questions of fact, truth, correctness, validity, and clarity can neither be posed nor answered."

Many of them came from an automotive culture that was proud to be on the leading edge of the technology, and they were proud to speak in automotive slang terms. It was a way of displaying experience and expertise with the trade. As the tradesperson repeatedly used the automotive terms, it became more acceptable to shorten or modify the terms to convey the competency or command of the trade and the machine. Tradesmen were cool and cocky as they used the popular slang terms. This new complexity has teachers being forced to become different types of teachers. The idea that the teacher has lived experience conveys that these teachers may be struggling with the flexibility that must exist in a dramatically changing trade. jan jagodzinski (1992; this author does not capitalize his name) suggested that a theory of change and risk taking is an intrinsic part of life:

> Only then can new ground be found and life lived. To avoid the monotony of the journey, which happens when teachers predetermine the direction of the body, choreograph its trajectory, keep it on track without deviation, one must take risks; otherwise human flexibility is lost. Failure replaces tolerance. "Grades" are not lived as plateaus; its life is lost. Educational risk-taking requires that we place the body in a healthy tension. A dichotomous consciousness merely increases anxiety. Desire is perverted so that boundaries are maintained. (p. 161)

Another major shift was that in 1991 the Alberta Education graduation requirements changed. These changes reduced the percentage of option classes in which a student could enroll, and a larger percentage was allocated to academic areas. Automotives, along with most trade-career programs, declined by 20%-30% within that period. Automotives were and still are one of the most popular option classes. Many districts are allowing fourth-year high school students to complete academic areas only. This was not the case in the modern era of high school automotives when students would take an extra year of classes, many of which would be automotives, because the student could accumulate hours and courses for advanced standing in becoming an apprentice. The traditions of the modern era were to more closely follow the demands of industry and allow willing students to fill the required jobs of the community.

The Trade of Today

Today's trade is one of man's great acclamations. Many new vehicles on our road possess more microprocessing capabilities than did the space-age rocketry or vehicles technology of the 1980s. The notion that the academically challenged student stands a chance at being an automotive mechanic/technician is unrealistic. Many of the teachers in our high schools would struggle with the diagnosis and repair of today's vehicles. Students and the majority of teachers of this postmodern era play only with the cosmetics of the automobile and have become content with learning the complex nature of the automobile's systems for the primary purpose of transportation. The trade is highly specialized now. Each of the major manufacturers has had a vested interest in the upgrading of their mechanics/technicians to enable them to continue to be competent with the ever-increasing design changes on today's automobiles. Most of the manufactures realize that the best mechanics/technicians are the individuals with the ability to know and learn the theoretical systems and subsystems to diagnose on-board computer trouble faults. These skills are beyond those of most of the traditional mechanics, who spend much of their time repetitiously replacing commonly well-known parts from specific years, makes, and models which are known to most mechanics as the cause for common automotive troubles.

The postmodern idea lends itself to the interwoven aspects of how automobiles affect society in different ways. The automotive industry is vastly underestimated in its contribution to the country's gross national product. This in itself may provide some justification for educating in this area because of the relevance issue facing students. Other postmodern ideas are the differences in the hegemonic aspects of the past and present automotive mechanic. The human has become more distant to touch, smell, sound, and physical movement. Most of what takes place now is visual and is aided by a scanner that searches for trouble codes and conveys them to the mechanic. This has changed the personal attributes of who might be interested in mechanics or who might be

more successful at making a career of it. Students who typically like to work with their hands are finding that the diagnosing aspect of automotive repair is time consuming and is quite different from what is considered "hands-on." Teachers who have upgraded suggested that they had to acquire a new language. The old slang terms and the "cool" delivery are gone; the slang is not acceptable in postmodern automotives. The new language requires a universal theme because of the need to know the constantly growing terminology. The postmodern language has taken on acronym-filled jargon to shorten some of the long names. The language of the different times seems to dictate the difference[6] of the times, cultures and the experiences of the tradesperson. Shotter (1993) referred to this relationship between language and the imagined thoughts as they influence the ways of existence: "To imagine a language is to imagine a form of life" (p. 232). The postmodern mechanic or enthusiast has evolved from playing with technology to being content with understanding how the complex reliability is achieved. The postmodern view of today's discourse (master narratives)[7] is one of justification of departmental budget versus the funds that the particular high school will collect for each CTS module in the hope of balancing the program budget. The postmodern meta-narratives of today assume much of their validity from their own truth claims. These claims differ, because the past curriculum was to emulate successful programs to guarantee success and student results (not so much on "achievement" of completed

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[6] *Difference* is a structuring principle that suggests that definition rests not on the entity itself, but also in its positive and negative references to other texts. Meaning changes over time, and ultimately the attribution of meaning is put off, postponed, deferred forever.

[7] *Narrative* is the postmodern opinion that varies depending on the type of narrative under discussion. Postmodernists severely criticize meta-narratives, global world-views, and mastercodes. Meta-narratives are modern and assume the validity of their own truth claims. However, mini-narratives, micro-narratives, local narratives, and traditional narratives are just stories that make no truth claims and are, therefore, more acceptable to postmodernists.

modules for budget purposes, which was and still remains the buzzword for more academic curricula).

Framing the Deconstruction

The purpose of deconstructing a text[8] is a postmodern idea that is to analyze critically in both a traditionally conventional way and in non-conventional ways. It is then the intent to analyze the deeper structures and the meaning of the above "tradition." Jacques Derrida implied that tradition comes from a tapestry of interwoven threads and therefore is not "the one history" and that it is not sheltered in "the one history itself, . . . the one tradition" (Caputo, 1997, p. 37). Derrida also emphasized the complexity of the innumerable traditions that are housed within "tradition" (Caputo, 1997). He then explained that tradition is not a hammer to dissent and knock dissenters senseless. It is an empowering responsibility to read, to interpret, to select and discard the competing strands of tradition and the others' interpretation of their meanings of "tradition." Deconstruction is then to comprise an evolutionary aspect, as defined by Caputo in his study of Derrida: "For he sees deconstruction as a new way to keep the events of tradition going, to keep it on the move, so that it can be continually translated into new events . . . in a self perpetuating auto-revolution" (p. 37). The deconstructionist view that the traditional ways of the automotive industry and educational programs are only strands of future "tradition" of the automotive industry and education programs helps us to understand that by being analytical in the deconstructionist realm, we might be better able to serve the student, school, and automotive industry.

The idea of deconstructing the existing curriculum becomes one of reworking many of the accepted givens or "truths," as we have come to perceive them. We know that perception can change, and it seems only reasonable that by deconstructing the text,

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[8] *Text* is all phenomena, all events. Postmodernists consider everything a text.

we may get those insightful sparks that allow us to further evolve or spiral down other paths to further unfold the textual tapestry of the curriculum around us. Automotive teachers need to seek out and study the discourses that they can find. Traditionally, teachers were most likely to search out and embrace those works similar to the unanimously accepted theories accepted by the university and colleges. Traditionally, the meta-narratives have usually become so by the adoption of discourse as having unquestionably valid or established truths. Banks (1998) was critical of grand theories because

> researchers usually feel obligated to interpret their findings in ways that will support their theories. The theory must remain intact, . . . [and] findings are described in ways that will fit the theory. This often results in descriptions of events and situations that are extreme and that are characterized by an inattention to details that the grand theory does not explain and by explanations that are incomplete or misleading. (pp. 149-150)

To deconstruct we have to ask why it is important to the narrator to write the discourse. However, this is a traditional sign of disrespect. Allowing students to question the teachers for their answers or to ask questions such as “Are we ever going to need this ‘knowledge’ again in our lives?” suggests that these responses are only headed towards deconstructing the accepted methods and traditions. To deconstruct is to critically analyze and find different interpretations or mixes of the smaller segments of the existing traditions and truths. The narrator is suggesting that many different approaches exist to deconstruct, and the postmodern times are more accepting of this once the parameters and intentions are explained.

The researcher provides the following as profound discourse which could further the phenomenological makeup of the reader[9] and further explain the relationships

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[9] *Reader* is an observer. Postmodernism is reader-orientated and gives readers the power to interpret a text that, in modern terms, belongs to the author. Postmodern readers are dramatically empowered.

between past traditions in automotive programs and the presently evolving traditions as initially interpreted by the rock group Pink Floyd in 1975:

WELCOME TO THE MACHINE

Welcome my son, welcome to the machine.
Where have you been? It's alright, we know where you've been.
You've been in the pipeline, filling in time, provided with toys and
"Scouting for Boys."
You bought a guitar to punish your ma.
And you didn't like school and you know you are nobody's fool,
So welcome to the machine.

Welcome my son, welcome to the machine.
What did you dream? It's alright, we told you what to dream.
You dreamed of a big star, he played a mean guitar.
He always ate in the Steak Bar. He loved to drive in his Jaguar.
So welcome to the machine.

Traditionally, the machine has been seen as negative—the machine being the laborious days of the worker who is not being significantly challenged by his/her job. It is the belief that the worker becomes a component of the machine created by an elite "other" or of ignorant workers who have not clearly thought out the larger picture of the meaning and reasons for their labor. The lyrics suggest that the workers of the machine are provided with toys and that the workers are in a pipeline. This is understood to be in a society of order and reward for serving the elite. One can deconstruct the text in different ways. The literal automotive deconstruction is the reference to the love of driving in his Jaguar, a car which signifies the European elite in the eyes of most automotive tradespersons who repair these vehicles, yet rarely become able to afford to own one. The year of the song might also help us understand the significance of changing times. In 1975 Jaguar was a brand name associated with technology, and now the Jaguar is technically outdated, possessing many of the same design features of the 1970s. Today most domestic midsize cars are superior to the Jaguar in technology. The struggling Jaguar plant has recently

been bought out by Ford Motor Company. The explanation of the Jaguar's demise could be viewed as a parallel to the automotive educational program in that many automotive teachers feel that they were once a "Jaguar" and because of a failure to retool in the areas of curriculum development and the industry's demands, are headed towards being bought out.

Future Directions

Curriculum discourse as deconstructed text is the belief that the traditional educational methods of developing curriculum may or may not lead to creating or establishing student environments for learning. Maybe by becoming reacquainted with current tradespersons who have the skills to be proficient in today's industry, the schools and teachers could better understand the evolutionary process that has taken thus far and become better prepared for the direction of future curriculum demands. A theme exists within the colleges of Alberta to become more sensitive to the different aspects of the automotive industry. This theme helps to guarantee that the college sets the example for the students that change is an evolutionary process. The deconstruction of the existing methods of curriculum development may be another way to gain insightful advances and ideas of the limitless possibilities that exist for students to learn what is desired by schools and what is desired by the students themselves. This deconstructed view would have teachers and students trying to analyze the existing methods, ideas, and procedures to consider different ways or creating different environments for learning the skills and attributes that are most like what journeypersons require to repair vehicles in an acceptable fashion. The colleges that train apprentices have done virtually all of the analysis, hypothesizing, and testing of different methods of delivering current automotive knowledge and skills. As with the story of the fly, schools should consider modeling more closely the colleges' philosophies, curriculum, and delivery methods until they have the confidence and expertise to evolve and change the high-school-based curriculum to

ensure its future success. The examples of the proven college curricula might mean lower student-teacher ratios, academic standards of entry, team teaching, gender-sensitive curricula, and students' focus on competition vehicles as a means of instilling the discipline of preparation, anticipation, and estimation of future repairs.

The deconstruction of the high school automotive program may be what is required to show those involved with it some of the aspects of which they were unaware, and this may help to speed the evolution of better meeting the needs of those involved with it. Derrida's definition of deconstruction is that deconstruction is to show that things—texts, institutions, societies, beliefs, and practices of whatever size and sort you need—do not have definable meanings and determinable missions, that they are always more than any mission would impose, that they exceed the boundaries they currently occupy (Caputo, 1997, p. 31). This dynamic evolution may also be an example for other curricula that are constantly being redefined by technology and the society's amalgamation with it.

CHAPTER VII

CONCLUSION

Growth and Decline Factors

This study can contribute to a better understanding of the factors that affect the growth and decline of Alberta's CTS automotive programs. It has attempted to use both qualitative and quantitative methodologies to research, ascertain, and substantiate the factors concerning growth and decline. The following is a list of categories that summarize the growth factors, decline factors, and the future recommendations that pertain to the study. These conclusions are explained in greater detail in previous chapters.

1. Teacher-based factors and future recommendations
2. School-based factors and future recommendations
3. School counselor-based factors and future recommendations
4. School board-based factors and future recommendations
5. Alberta Learning-based factors and future recommendations

Teacher-Based Factors and Future Recommendations

In most instances the teacher-based growth and decline factors have to be supported by the school administration. Whether the decisions regarding the automotive program are made by the teacher or the various levels of administration, the factors for program growth and decline usually affect the program in a similar way. Listed below are the growth factors, decline factors, and future recommendations that are associated with the decisions of the automotives teacher:

- Successful programs tend to have a high percentage of customer service work.
- It is recommended that the automotive teachers administer their own work-experience students in the community's automotive-repair facilities.

- Students appreciate the relevancy of customer service work.
- A teaching aide in automotives should have journeyperson status.
- It is recommended that teachers, school administrations, and school boards view the province's model high school and college automotive programs.
- It is recommended that high school automotive programs have cordless telephones.
- It is recommended that the automotive program have Internet service in the shop area for automotive technical support.
- It is recommended that the automotive program have a digital camera for student repair procedures.
- It is recommended that the automotive program use a parts supplier who will pick up and deliver supplies to the automotive department, such as used parts and small shop retail purchases.
- It is recommended that automotive programs not use purchase orders.
- Programs with shop vehicles that are used for extracurricular activities—such as racecars, go-carts, race watercraft, race motorcycles—and shop car raffles are positive growth factors.
- Insufficient quantity of school equipment and the improper working of that equipment are major program decline factors.
- It is recommended that automotive programs hold fund-raising raffles to supplement the automotive program's yearly budget when required.
- Having students participate in time-consuming manual labor tasks such as filing project are a decline factor.
- The general use of shop vehicles for repair practice contributes to decline.
- Automotive programs without extracurricular activities tend to be a major factor contributing to decline.

- The use of shop vehicles for a one-time total disassembly and the labeling of parts by introductory-level students is a growth factor.
- Automotive programs' incorporation of special-project students who have completed many of the courses successfully is a positive growth factor in the programs and for the participating students.
- CTS-trained teachers in the multi-activity exploratory strand training are an important growth factor for those smaller high schools that have small multi-activity shops.
- Automotive teachers, school administrations, and districts should be aware of and have a policy on student safety issues.
- Students being guided through modules/courses with learning guides rather than with teacher instruction is a significant program decline factor.
- Equipment and tool organization is an important factor for program growth.
- Parts and supplies organization is also an important factor for program growth.
- Automotive programs that do inventory of equipment, parts, and supplies are considered programs with a positive growth factor.
- Teachers, schools, and districts should be aware of the legislation and responsibilities of the Workers' Compensation Board, Occupational Health and Safety, and the Labor Board Regulations.
- The delivery of each module/course to the entire class simultaneously is a very important factor in the growth of an automotive program.
- The number of shop bays and compound-storage aspects in relationship to student-teacher ratios in an automotive program are very important to the growth of the program.

- Schools must establish the modules/courses to be offered on the basis of the quantity of equipment required to have the students actively participate in the shop environment in each particular module/course.
- Program personnel, school administrations, and districts should educate the student in the requirements and particulars of how the automotive strand modules/courses can contribute to the student's high school experience and further trade training.
- Program personnel, school administrations, and districts should have a tracking system in place to indicate automotive strand modules/courses taken; this documentation should be available to each student in the program.
- The automotive program's yearly budget and money-generating aspects are important factors in the program's growth.
- The provision of shop-related extracurricular activities is a very important growth factor.
- The automotive program module/course flow chart and the sequence of modules/courses are very important to the program growth.
- It is recommended that a textbook be provided for each student in the automotives program, which would be a positive growth factor.
- Automotive teacher interaction/professional development with other automotive high school and college teachers is a very important factor in program growth.
- Schools must have sufficient numbers of students to properly fill classes and offer enough different modules/courses.
- Feeder-school recruitment is a positive influential factor in the growth of an automotives program.
- Classes should be long enough to better allow for setup, cleanup, and frequency (1.5+ hours every day).

- Schools should offer vehicle-ownership types of classes to entice more females to become involved in the school's automotive program. This usually leads to a moderate percentage of female students taking other automotive courses.
- Schools should offer ESL vehicle exploratory types of classes, because many immigrant students are interested in cars and appreciate the hands-on nature of the shop environment. This usually leads to a moderate percentage of these ESL students taking other automotive courses once their English skills are sufficient for the safe shop work of the typical automotive courses.
- The automotive program should bundle a number of modules/courses to simplify administrative duties for the teacher, students, and school administration.
- Individual school, shop, or district policy on any of the aspects of the school's automotive programs is a very positive factor.
- Raising student-teacher ratios to incorporate a journeyperson aide is a positive way of temporarily making the transition to a growing program until such time as student numbers are large enough to justify another journeyperson teacher.
- Journeyperson-qualified teachers are perhaps the most important growth factor in automotive programs.
- Current Automotive Service Excellence (ASE) upgrading certification is a very important factor for program growth.
- High school programs should more closely model college programs in the area of student-teacher ratios for program growth and safety.
- It is recommended that a student-teacher ratio for each particular shop be established in every automotive program.

School-Based Factors and Future Recommendations

In most instances the school-based growth and decline factors are influenced by the school's board administration. Whether the decisions in the automotive program are made by the teacher or the various levels of administration, the factors for program growth and decline usually affect the program in a similar way. Listed below are the growth factors, decline factors, and future recommendations that are associated with the decisions of the schools' administration:

- Scheduling of classes should have more of the same students enrolled in a greater number of modules/courses during a particular semester. This allows more of the students' project vehicles to remain in the service bays until completion.
- It is recommended that the schools and school boards recognize the positive public-relations aspect of having an automotive department that offers customer service.
- Automotive teachers, school administrations, and districts should be aware of and have a policy on student safety issues.
- The automotive program's yearly budget and money-generating aspects are important factors in the program's growth.
- Schools and districts should be cognizant of the wage-parity issues of grid placement concerning journeyperson teachers.
- It is recommended that a student-teacher ratio for each particular shop be established in every automotive program.
- Individual school, shop, or district policy on the school's automotive programs is a very positive factor.
- Raising student-teacher ratios to incorporate a journeyperson aide is a positive way of temporarily making the transition to a growing program until

such time as student numbers are large enough to justify another journeyperson teacher.

- Schools, administrations, and districts should consider a means of retention and/or recruitment of journeyperson teachers.
- The automotive program should bundle a number of modules/courses to simplify administrative duties for the teacher, students, and school administration.
- The number of shop bays and compound-storage aspects in relationship to student-teacher ratios in an automotive program are very important to the growth of the program.
- Automotive programs' incorporation of special-project students who have completed many of the courses successfully is a positive growth factor.
- Schools must have sufficient numbers of students to properly fill classes and offer enough different modules/courses.
- Feeder-school recruitment is a positive influential factor in the growth of an automotives program.
- Classes should be long enough to better allow for setup, cleanup, and frequency (1.5+ hours every day).
- Schools should offer vehicle ownership types of classes to entice more females to become involved in the school's automotive program. This usually leads to a moderate percentage of female students taking other automotive courses.
- Schools should offer ESL vehicle-exploratory types of classes, because many immigrant students are interested in cars and appreciate the hands-on nature of the shop environment. This usually leads to a moderate percentage of these ESL students taking other automotive courses once their English skills are sufficient for the safe shop work of the typical automotive courses.

- It is recommended that the school and school boards recognize the positive public relationship created with industry when the automotive teachers administer their own work-experience students in the community's automotive repair facilities.
- It is recommended that teachers, school administrations, and school boards view the province's model high school and college automotive programs.
- It is recommended that the automotive department have a separate telephone line to better support the customer service aspect of the program.
- It is recommended that schools offer vehicle-ownership as opposed to repair types of classes to entice more female students and lower-functioning students to become involved in the school's automotive program.
- It is recommended that schools establish the modules/courses and student-teacher ratio on the basis of the quantity of the specific equipment required to have the students actively participate in the shop environment
- Programs, school administrations, and districts should have a tracking system in place to efficiently indicate automotive strand modules/courses taken, and it should be available to each student in the program.
- Students requiring a teaching aide in automotives should have an aide of journeyperson status.

School Counselor-Based Factors and Future Recommendations

In most instances the school counselor-based growth and decline factors are influenced by the school's administration. Whether the decisions in the automotive program are made by the teacher or the various levels of administration, the factors for program growth and decline usually affect the program in a similar way. Listed below are the growth factors, decline factors, and future recommendations that are associated with the decisions of the school's counselors:

- It is recommended that lower-functioning students not be placed in automotives programs due to the amount of theoretical knowledge required and the safety issues.
- Feeder-school recruitment is a positive influential factor in the growth of an automotives program.
- Schools should offer vehicle-ownership types of classes to entice more females to become involved in the school's automotive program. This usually leads to a moderate percentage of female students taking other automotive courses.
- Schools should offer ESL vehicle-exploratory types of classes, because many immigrant students are interested in cars and appreciate the hands-on nature of the shop environment. This usually leads to a moderate percentage of these ESL students taking other automotive courses once their English skills are sufficient for the safe shop work of the typical automotive courses.
- Automotive programs' incorporation of special-project students who have completed many of the courses successfully is a positive growth factor.
- It is recommended that schools offer vehicle-ownership as opposed to repair types of classes to entice more female students and lower-functioning students to become involved in the school's automotive program.
- Individual schools, shops, or districts should have their own automotive policy handbook that outlines the counselor's contribution.
- High school programs should model college automotive programs in the area of student recruitment and advertising.
- Schools should offer ESL vehicle-exploratory types of classes, because many immigrant students are interested in cars and appreciate the hands-on nature of the shop environment. This usually leads to a moderate percentage of these ESL students being successful at taking other automotive courses once their

English skills are sufficient for the safe shop work of the typical automotive courses.

- Teachers, schools, and districts should be aware of the legislation and responsibilities of the Workers' Compensation Board, Occupational Health and Safety, and the Labor Board Regulations.

School Board-Based Factors and Future Recommendations

In most instances the school board-based growth and decline factors are self-serving and are directed to the school administration. Whether the decisions in the automotive program are made by the teacher or the various levels of administration, the factors for program growth and decline usually affect the program in a similar way. Listed below are the growth factors, decline factors, and future recommendations that are associated with the decisions of the school's board:

- High school programs should model college automotive programs in the area of student recruitment and advertising.
- It is recommended that the teachers, the school administrations, and school boards view the province's model high school and college automotive programs.
- It is recommended that a student-teacher ratio for each particular shop be established in every automotive program.
- Students requiring a teaching aide in automotives should have an aide of journeyperson status.
- Schools and districts should be cognizant of the wage-parity issues of grid placement concerning journeyperson teachers.
- CTS-trained teachers of the multi-activity exploratory strand training are an important growth factor for those smaller high schools that have small multi-activity shops.

- It is recommended that the school and school boards recognize the positive public-relations aspect of having an automotive department that offers customer service.
- Individual school, shop, or district policy of the school's automotive programs is a very positive factor.
- Schools and districts should be cognizant of the wage-parity issues of grid placement concerning journeyperson teachers.
- Schools, administrations, and districts should consider a means of retention and/or recruitment of journeyperson teachers.

Alberta Learning-Based Factors and Future Recommendations

In most instances Alberta Learning-based growth and decline factors are self-serving and are directed to the school boards. Whether the decisions in the automotive program are made by the teacher or the various levels of administration, the factors for program growth and decline usually affect the program in a similar way. Listed below are the growth factors, decline factors, and future recommendations that are associated with the decisions of Alberta Learning:

- It is recommended that Alberta Learning select a southern and northern automotive liaison teacher to assist the automotive teachers with program delivery and continuity issues.
- Teachers, schools, and districts should be aware of the legislation and responsibilities of the Workers' Compensation Board, Occupational Health and Safety, and the Labor Board Regulations.
- It is recommended that teachers, administrations, boards, and Alberta Learning visit model automotive programs in the province to gain insight into the many variables required to have a successful automotive program.

- High school programs should model college automotive programs in the area of student recruitment and advertising.
- It is recommended that because our province has one education minister for the first time who governs the K-12 system and the postsecondary institutions, implementation of continuity transition links should be established to better support the automotive student's interests and training.
- It is recommended that the Grades 7, 8, and 9 industrial arts, high school automotives, and college automotives programs' visit one another at least once a year.

Many students who have continued on to become apprentices and have gained journeyperson status reported that their junior high school industrial arts program was unorganized. They reported that many of the students had fun in the shop/lab environment and socialized. They also reported that the junior high students did not learn or do very much in the classes, because there were simply too many students to facilitate interaction with the teacher. There was also the lack of school supplies, and there were few pieces of equipment, so most projects were simple and small. When students were asked what they would like to build in industrial arts before they take any of the courses, they expected to work on large, complex projects that were more relevant to them. Examples of these projects would be a Walkman in the electricity portion and a stereo stand in the woods portion of the classes. This did not change as the student completed junior high and prepared for the high school CTS programs. The students were usually disillusioned with the three years spent in the industrial arts program and were very interested in the high school programs, which they believed were more relevant and consisted of projects that were more complex in each of the trade strands. Students who were about to begin Grade 10 Automotives were asked what they thought they would be doing in the classes. The students consistently reported expecting to repair all aspects of

cars, rebuild engines, rebuild transmissions, and even design and build cars for themselves. They soon realized that the reality of their Grade 10 automotive experience would be centered around acquiring the knowledge of tools and shop safety and the basics of vehicle cleaning and vehicle maintenance. Many students in the Grade 10 programs reported that much of their time is spent cleaning parts, sweeping floors, and doing general shop organizational duties. Many of the Grade 10 students were interested in the Grade 11 and 12 modules/courses, because they hoped that they would be more related to what they had expected that they would be doing in the Grade 10 classes. Grade 11 and 12 students reported that, by Grade 12 and after accumulating 20-30 module/courses, they were then doing the fun and challenging repairs with some competence.

As the students continued on in a college automotive course, they expected to be doing extensive repairs and for the most part were content with the level of individual instruction and the various customer-service projects or shop-vehicle projects they had to do. These apprentices then work in their trade industry for 10 months and return to a college for the next round of training. This is repeated four times in an apprentice's automotive training. When the four years of schooling and trade experience are completed, the apprentice can challenge the Journeyperson Provincial Exam and the Inter-Provincial Red Seal Exam. It is at this point that these new journeypersons stated that they had seen much better examples of teaching and shop practices in the colleges than in the junior high or senior high school automotive programs. When these previous students were asked what should be changed in the junior high school industrial arts programs and senior high school automotive programs, they usually stated the following:

- Junior and senior high schools should have lower student numbers and better equipment in the industrial arts labs and the automotive shops.
- There should be a distinct segment of the program that educates junior high students by having them experience the trade strand by visiting the high

school program and the college program, then repeating this activity when the students are in the high school program. The high school students should revisit the college program and possibly go back and visit the junior high school to inform the junior high students and create a sense of continuity in the program.

- Junior and senior high schools should provide better supplies and shop vehicles for the students to demonstrate their abilities.
- Virtually all of these new journeyperson automotive mechanics stated that the teachers in the senior high school automotive programs were doing very well given the lack of resources and the overcrowding of the classes. These new journeyperson mechanics now had experienced the three distinct educational segments of vocational education (the junior high school industrial arts, the high school automotives programs, and the college automotive programs). They also stated that much of the educational shop practice and course programming/policy that takes place in the high school programs would not be tolerated by the adult students in the college programs who have more life experience dealing with institutional bureaucracy.
- The college automotive programs are clear professional examples of well-run and safe automotive training.
- Most of the new journeypersons stated that their high school automotive program was still a positive factor contributing to their overall high school experience. This also seems to be true of students who did not go on to become apprentices in the automotive trade.

Virtually all journeyperson teachers in the high school automotive programs stated much of the same comments on their "Teacher Perception Surveys." It seems that anyone who experienced the positive learning environment of the college automotive

training programs was quite specific as to how the high school program could be improved.

The college automotive programs are increasingly becoming more stringent on shop safety, which is of growing and major importance to industry. This is also paramount in the college's philosophy of providing a safe training facility and passing on only those safe trade practices while emphasizing that no job site is worth the injury that may take place when safety practices are not acknowledged. The journeyperson teachers of the high school automotive programs and new journeyperson mechanics stated that the level of safety in their high school program is lower. Yet many of the teachers of these programs stated that their requests for raising student safety to accepted industry or college levels is never considered a priority of the school's administration and/or the district's policy. With some of the automotive accidents that have occurred and the one highly publicized death in the Halton District high school incident, this aspect of understanding the issues concerning safety levels is still not being recognized by most high school automotive programs and the districts in the Province of Alberta. Here are some of the major changes suggested by the coroner who conducted the inquest and who investigated many of the automotive program's safety issues following the major student tragedy (Ontario Association of School Board Officials, 1998):

- No more than 20 students per qualified teacher.
- Safety procedures must be tested at the beginning of the courses.
- Mandatory training every two years to update teacher qualifications.
- Installation of protective barriers and other environmental changes.
- Policy for moving vehicles in the shop.

While I researched this incident, it became quite evident that those interviewed who were involved at the school or district level felt that this one incident and the inquest have probably changed forever how the community views the school. The inquest concluded

that the automotive industry and the automotive adult college training centers are safer than all of the high school automotive programs investigated as part of the inquest.

Alberta's automotive programs were virtually identical to the programs in Ontario before the safety changes were identified and put in place. Alberta in some instances may be even more lax, because nonjourneyperson teachers may have no direct safety training and certainly do not have the rigorous safety training as part of their apprenticeship and trade-related experience. At the present time in Alberta there is only one school board attempting to write a policy on these issues, and they are general statements that encompass all strands of CTS. The board reported that this policy is still in development and that it began writing the document in 1998. One of the equipment suppliers has stocked some of the safety wheel chocks for industry and for the schools. He reported that only two sets have made their way into any of the Alberta high schools thus far. Although I conducted shop observation surveys of each of the province's automotive shops, I did not observe any of these wheel chocks, and few teachers reported hearing of them or the other safety-related issues of the Halton District Safety Report. Most teachers agreed with all of the coroner's recommendations; most of them are common sense and/or standard industry practice.

Another interesting observation of the research is that the large automotive programs are located in the major cities, and the smaller programs and the combined CTS shop programs are in Alberta's smaller cities and rural towns. Not only are there more of the larger automotive programs in the cities, but because of this, there are also more automotive programs for the city students to choose from. The rural students of Alberta fill these small programs well over acceptable limits because many of these rural students have hobbies and home lives that are more closely related to the automotive programs than those students in the major cities do. These smaller rural automotive programs had a constant supply of student motorcycles, snowmobiles, quads, and student class vehicles, because public transportation in those areas does not exist. Most of the rural students

reported getting their driver's license at the age of 16 out of necessity. The city automotive students take automotive courses more to learn how to fix other vehicles and some day buy their own and repair them. Most city students bring in family's and friends' vehicles for routine maintenance and light repairs.

The automotive teachers of Alberta usually do not teach out of their area. The main reason is that virtually all of the province's automotive teachers hold journeyperson status in the automotive trade and have additional years of trade-related experience. These individuals are generally the highest-educated teachers in their subject areas within the schools that they teach. They also have direct work experience in their subject area, and most do not feel qualified to teach other subjects, about which they would know little or nothing compared to their extensive automotive subject matter. Many of the academic teachers have little or no university training in any area other than their major and their minor, yet many are given or assume other subject teaching assignments. Very few academic teachers have acquired any work experience in the related subject areas in which they teach.

The college educational system differs in that the academic subject area teachers must also possess related work experience. This is rarely the case in Alberta's high schools. Examples of this would be a scientist teaching science and a politician teaching social studies. Automotive teachers are reluctant to teach in other subject areas, and they begin to do so only when the automotive program enrollment declines. Findings show that when this begins to happen, further decline of the program takes place because the teacher is not in the shop to arrange customer service, answer the phone, sign for the parts, and attend to drop-in customers and salespersons.

Few take any professional development in education or in further automotive training. I accumulated many interesting ideas and/or techniques from the various automotive teachers and their programs while I gathered data from virtually every

automotive program in the province. Some of these ideas are provided throughout the research, with others provided as handouts in the appendixes.

Virtually every long-term automotive teacher stated that the administrative aspects of their automotive shop have increased tremendously over the past 15 years and have increased even more since the inception of the new CTS curriculum.

CTS teachers in Alberta, which includes automotive teachers, are in the group experiencing the highest levels of stress. Stress-related leaves within this group of teachers are high and increasing. When a CTS teacher goes on stress leave, there is usually no one to fill in who is journeyperson qualified, so rapid program decline takes place. Upon the teacher's return, school administrators are usually more cautious about overloading the CTS teacher's classes and placing too many extra obligations on the teacher. The returning teachers have commented that the leave was needed and that if the situation becomes intolerable again, another stress leave would be warranted. These stress leaves can be 90 days with full pay and up to two years at 75% of the teacher's salary through the Alberta School Employee Benefit Plan. The medical doctors of Alberta are aware of the high levels of stress associated with teaching and often support 90 days of stress leave. The Alberta School Employee Benefit Plan requires a professional assessment by one of its recognized psychiatrists on a recurring basis for the two-year benefit period. These visits are usually once a month for 30 to 45 minutes.

Many of the automotive teachers like their jobs, and few have left to pursue other interests besides teaching. Few automotive teachers ever move from the school in which they began their automotive teaching. In the teacher perception surveys distributed to virtually every automotive teacher in the province, it became a recurring theme that most of this province's automotive teachers will soon retire, and a few spoke of accepting the incentive of an early-retirement package. This will have a major impact on our province's high school automotive programs, because there are almost no automotive journeyperson teachers currently in our province's universities. I consulted with one soon-to-be-

graduating automotive teacher who was contemplating teaching in his minor area and not in automotives because of the extra responsibility and the small financial benefit in most districts' pay grids. This graduate also stated that the only other automotive teacher soon to graduate was not interested in teaching in the subject area of automotives and had specifically been educated in another subject area for the purposes of employment and interests. It is important that the province's boards note this information, because there are already shortages of journeyperson automotive teachers in the larger city schools. Some districts have been successful in recruiting three journeyperson teachers from out of province who wanted to locate in Alberta. Currently, at least six more journeyperson teachers are needed province-wide. With the shortage of journeyperson teachers, Alberta Learning and the province's universities should consider giving advanced standing for trade qualifications in the education faculties. At this time, only the University of Alberta provides a small amount of advanced standing for students who possess a journeyperson's trade certificate. The boards, districts, ATA, and Alberta Learning should provide adequate financial incentive for journeypersons to become teachers in their trade strands. Mechanics earn an average of $55,000 per year, and the average beginning journeyperson with a four- or five-year bachelor's degree earns $37,000. Even at the highest placement on the school pay grids, the wage is only comparable. The alternative is to allow the journeyperson to teach with a letter of authority from the Minister of Learning. This seems to be a viable means of sustaining an automotives program when a journeyperson teacher cannot be found. Journeyperson teachers could benefit from mentorship relationships with non-jouneyperson teachers until they are confident with classroom-management issues. The positive side of obtaining a letter-of-authority journeyperson is that such individuals have the knowledge of automotives and will learn the strategies to facilitate the students' learning of the concepts of automotive mechanics.

The automotive program is one of the most popular CTS courses in those schools that offer the program. The high school dropout rate is high, and the students who are at the most risk are those who are in the CTS route. Some of the automotive teachers stated that many of the automotive students would not attend school as often if it were not for the shop policy that allows students to work on their vehicles only if they have not been absent from class. As the automotive and other CTS strand programs decline, the dropout rate will rise. In 1960 an initiative was put in place to train and educate Canada's out-of-work youth. Most of the unemployed youth were those who did not complete high school. The Star Report of the 1960s stated that 9 of every 10 unemployed people had not completed high school. Although no relevant statistics could be found for the unemployed people of 2000, the apprenticeship and college programs indicate that these figures are comparable because the dropout rate is about the same, and the dropout rate usually coincides with the unemployment statistics and apprenticeship demands.

Past studies have shown that relevant skill training is a positive factor in high school students' staying in school, and fewer of them are unemployed later in life. As in the past, the requirement for skilled tradespersons has approached serious levels in our country. It is for these reasons that schools should recognize the contribution that a successful automotives program can make to a school's mission in providing an education that fosters all of the students' varied talents and also serves to supply the community with able workers.

Industry wants workers with relevant skills. The automotive industry and other related trades work closely with the colleges and the Apprenticeship Board to specify the skills and the exam-question banks that can indicate the accountability of the automotive course. There are many different educational theories that can challenge this method of specifying student outcomes and verifying them with a written exam that test the higher analytical process of dealing with the subject matter. There are also the questions of the purpose of these programs. Until other studies indicate better results than the colleges'

format for curriculum development and evaluation, the colleges' model of automotive programming should be used as a template for the province's high school automotive programs. A respected study that is frequently referred to by college automotive faculties is the study of student perceptions of the trades and their knowledge of the apprenticeship process. The following are the conclusions found by the study *Youth Decision Survey* of Nova Scotia Department of Education and that province's Provincial Apprenticeship Board (2000, p. 27). High school students

- consider themselves strongest in the subjects of English and communication and weakest in mechanical skill;
- know much more about jobs in the entertainment field than jobs in trades and construction;
- have some awareness of skilled-trades opportunities and tend to have positive perceptions of skilled trades, but appear to have limited knowledge of apprenticeship and the relationship between apprenticeship and skilled trades;
- believe that they are more likely, once their education is complete, to work in the fields of agriculture, energy, forestry, manufacturing processing, pharmaceuticals, telecommunications, and trades and construction;
- find the advice of teachers, guidance counselors, and family more useful than any other information source in helping decide what they want to do when they leave school;
- consider 'personal likes/dislikes' and 'secure future' as the most important issues when considering what they are to do after leaving high school. 'Decisions of friends' and 'teacher's/guidance counselor's opinion' were considered the least important issues;
- believe that their parents would like to see them go to university or community college after leaving high school. Very few thought that their parents would like to see them become an apprentice/tradesperson; and

- have learned about apprenticeship more from family and class discussion than any other source.

After this report, the provincial agencies involved expressed interest in proceeding with the challenge of identifying actions, initiatives, and projects to increase the awareness of high school trades training and the process of apprenticeship.

The colleges and the apprenticeship boards in Alberta have shifted in their philosophy that the high schools should focus on the three R's and that the trades-vocational training should be left up to the colleges. The schools with no CTS automotive programs rarely have students who ever become automotive or any other trade apprentices. Alternatively, those schools with automotive programs routinely inspire some of those students to pursue becoming an apprentice in the automotive or related trades area. It is for this reason that there is a new interest in the continuity of skill acquisition from the junior high industrial arts programs through to the college programs.

Some teachers and administrators stated that they thought that Alberta Learning was not doing much for the automotive programs because they suspected that Alberta Learning wanted to phase out these programs due to the expense and the many variables involved in establishing and maintaining successful programs. This does not seem to be the case, because the schools that value and support their automotive program generally have successful automotive programs, and the issue seems to be one of a site-based decision to understand and implement the necessary changes to grow the program to sufficient numbers.

Given the 'clearer' picture presented throughout this thesis, the challenge is to proceed with actions, initiatives, and projects to better provide the automotive program teachers and school administrators with the positive support to grow and maintain these relevant and popular courses in the CTS strand of automotive mechanics.

REFERENCES

Alberta Curriculum Standards Branch. (1997). Career & technology studies guides to standards and implementation 1997 [1 computer laser optical disc]. Edmonton: Author.

Alberta Curriculum Standards Branch. (1999). *Promising practices in CTS*. Edmonton: Alberta Education.

Alberta Education. (1998). *Career & technology studies: manual for administrators, counsellors and teachers* (June 1998 ed.). Edmonton: Author.

Alberta Labour. (1996). *The occupational health and safety act: a worker's guide.* Edmonton: Author.

Alberta Teachers' Association. Career and Technology Studies Council. (1997). *CTS circular* (Vol. 1). Edmonton, AB: Career and Technology Studies Council.

Anderson, G. M. (1979). *Vocational education in Newfoundland: A brief history.* Edmonton, AB: University of Alberta, Department of Industrial and Vocational Education.

Banks, J. (1998). *Multiethnic education: Theory and practice* (2nd ed.). Boston. MA: Allyn & Bacon.

Bezeau, A. (1971). *The relationship between trade practice and training practice in motor vehicle repair.* Unpublished master's thesis, University of Alberta, Edmonton.

Bishop, R. (1998). Freeing ourselves from neo-colonial domination in research: A Maori approach to creating knowledge. *Qualitative Studies In Education, 11*(2), 199-219.

Bruner, J. S. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.

Buck, G. H. (1997). *From summit to sea.* Calgary, AB, Fifth House Publishers.

Canada. (1960-61). *House of Commons Debates* (Vol. 1). Ottawa: Author.

Caputo, J. D. (1997). *Deconstruction in a nut shell: A conversation Jacques Derrida.* New York: Fordham University Press.

Career and Technology Studies, & Alberta Curriculum Standards Branch. (1995). *CTS communication network update* (June). Edmonton, AB: Author.

Chalmers, C. A. (1963). *Report on vocational education* [government publication]. Edmonton: Department of Education.

Chalmers, J. W., & Cunningham, R. H. (1968). *Teacher of the foothills province*. Toronto: University of Toronto Press.

Creswell, J. W. (1998). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Upper Saddle River, NJ: Merrill/Prentice Hall.

Davis, E. L., Zelinko, M. A., & National Center for Research in Vocational Education (U.S.). (1982). *Entrepreneurship in voc ed: A guide for program planning.* Columbus, OH: Ohio State University, National Center for Research in Vocational Education.

Dewey, J. (1929). *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.

Flick, U. (1998). *An introduction to qualitative research*. Thousand Oaks: Sage.

Floyd., P. (1975). *Wish you were here.* (Welcome to the machine.). Columbia Records.

Fraenkel, J. R., & Wallen, N. E. (2000). *How to design and evaluate research in education* (4th ed.). Boston: McGraw-Hill.

Fullan, M. (1991). *The new meaning of education change* (3rd ed.). New York: Teachers College Press.

Gauthier, C. (1992). Between crystal and smoke: Or, How to miss the point in the debate about action research. In W. F. Pinar & W. M. Reynolds (Eds.), *Understanding curriculum as phenomenological and deconstructed text* (pp. 184-194). New York: Teachers College Press.

Government of Canada. (1919). Statutes of Canada. Ottawa: Kings Printer.

Government of the Northwest Territories. (1903). *Annual report* . Edmonton, AB: Department of Education.

Grywalski, S. (1973). *A history of technical vocational education in the secondary schools of Alberta.* Unpublished doctoral dissertation, University of Oregon, Eugene.

Harder, J. D. (1970). *A proposal for industrial education* (unpublished manuscript). Edmonton: Department of Education.

Hathaway, R. S. (1995). Assumptions underlying qualitative and quantitative research: Implications for institutional research. *Research in Higher Education, 36*(5), 535-562.

Heslinga, J. (1998, March 8). *Alberta's flexible career and technology studies curriculum meets most of our students' needs.*

Hoschka, P. (Ed.). (1996). *Computers as assistants: A new generation of support systems* (Vol. VI). Mahwah, NJ: Lawrence Erlbaum Associates.

jagodzinski, j., & University of Alberta. Dept. of Secondary Education. (1979). *Towards a new aesthetic*. Edmonton: University of Alberta, Department of Secondary Education.

jagodzinski, j. j. (1979). *Towards a new aesthetic*. Edmonton: University of Alberta, Department of Secondary Education.

Johns, R. J. (1941). *Origin and development of technical education in Canada.* Unpublished master's thesis, Colorado State College, Fort Collins.

Kearney, R. (1988). *The wake of imagination: Ideas of creativity in Western culture.* London: Hutchinson.

Lipson, J. I. (1984). *Educational technology in vocational education*. Columbus, OH: Ohio State University, The National Center for Research in Vocational Education.

MacLean, G. (2000, November 10). Apprenticeship Board of Nova Scotia (personal correspondence on modularization).

McNair, P. K. (1993). *Alternative delivery strategies for career and technology studies curriculum*. Edmonton, AB: University of Alberta.

Meyer, A. (1965). *An educational history of the western world.* New York, McGraw-Hill Series in Education.

Munroe, D. (1974). *The organization and administration of education in Canada.* Ottawa: Secretary of State Department.

National Employment Service. (1960, December 10). Vocational training scheme seen slow to aid jobless. *Calgary Herald,* p. 19.

Nova Scotia Apprenticeship Board. (2000). *Youth decision survey: Summary report* . Halifax, NS: Department of Education.

Nye, B. E. A. (1991). *The lasting benefits study (LBS): A continuing analysis of the effect of small class sizes: Fourth grade technical report.* Nashville, TN: State University, Center of Excellence for Research in Basic Skills.

Olivier, W. P. (1985). *Videodiscs in vocational education*. Columbus, OH: Ohio State University, National Canter for Research in Vocational Education.

Ontario Association of School Board Officials [O.A.S.B.]. (1998). *Safety workshop-transportation technology report*. Burlington, ON: Halton School District, J. W. Singleton Centre.

Pinar, W. F., & Reynolds, W. M. (1992). *Understanding curriculum as phenomenological and deconstructed text.* New York: Teachers College Press.

Prichett, P. (1996). *Wise words of ancient educators*. Dallas, TX: Prichett & Associates.

Rabinow, P. (1984). *The Foucault reader*. New York: Pantheon Books.

Social Sciences and Humanities Research Council of Canada. (1998). *Research grants: Guide for applicants* [Online]. Available: http://sshrc.ca

Stan, G. (1973). *A history of technical vocational education in the secondary schools of Alberta.* Unpublished doctoral dissertation, University of Oregon, Eugene.

Van Maanen, J. (1998). *Tales of the field*. Chicago, IL: University of Chicago Press.

Wallace, K. W. A. (1970). *The private monetary returns to vocational education teacher training in Alberta*. Edmonton: University of Alberta, Department of Educational Administration.

Weldford Downs Distributing. *CDX Automotive training series.* Edmonton, AB: Author.

Wirt, J. G., & Muraskin, L. D. (1989). *Final report*. Washington, DC: National Assessment of Vocational Education.

Young, D. R., & Machinski, A. V. (1972). *An historical survey of vocational education in Canada*. Ottawa: Algonquin College Technical Centre.

Zurawell, J. M. (1981). *The predictability of automotive training success.* Unpublished master's thesis, University of Alberta, Edmonton.

OTHER WORKS CONSULTED

Alberta Construction Safety Association. (1991). *Leadership for safety excellence.* Edmonton, AB.: Author.

Alberta Construction Safety Association. (1994). *WHMIS: Trainer's guide.* Edmonton: Alberta Construction Safety Association.

Alberta Curriculum Standards Branch. (1997). *Career & technology studies guides to standards and implementation 1997* [1 computer laser optical disc]. Edmonton: Alberta Education Curriculum Standards Branch.

Buck, G. H. (1988). *Teaching machines and teaching aids in the ancient world.* Edmonton: University of Alberta, Division of Educational Research.

Buck, G. H. (1992). *Instructional devices, development, learning theories, and deployment.* Edmonton: University of Alberta.

Buck, G. H. (1999). *Authorware Professional as a research and teaching tool.* Edmonton, AB.

Checkel, M. D., MacLean, D. G., & University of Alberta. Dept. of Mechanical Engineering. (1991). *A practical vehicle energy audit using exhaust gas analysis.* Edmonton: University of Alberta, Department of Mechanical Engineering.

Clandinin, D. J. (1986). *Classroom practice: Teacher images in action.* Philadelphia: Falmer Press.

Clandinin, D. J. (1993). *Learning to teach, teaching to learn: Stories of collaboration in teacher education.* New York: Teachers College Press.

Clandinin, D. J., & Connelly, F. M. (1995). *Teachers' professional knowledge landscapes.* New York: Teachers College Press.

Dewey, J. (1929). *Democracy and education: An introduction to the philosophy of education.* New York: Macmillan.

Duffy, J. E. (1994). *Modern automotive technology* (Vol. 94). Tinley Park, IL: Goodheart-Willcox.

Duffy, J. E. (2000). *Modern automotive technology.* Tinley Park, IL: Goodheart-Willcox.

Erjavec, J., & Scharff, R. (1996). *Automotive technology: A systems approach* (2nd ed.). Albany, NY: Delmar.

Freed, M. N., Ryan, J. M., & K, H. R. (1991). *Handbook of statistical procedures and their computer applications to education and the behavioural sciences.* New York: Macmillan.

jagodzinski, j. (1996). *The anamorphic I/i: Finding my own step through the (my)nfield of pheminism and art: Autobiographical confessions of cross-dressing and re-dressing: Striptease in eight tacky steps*. Edmonton: Les Éditions Duval.

jagodzinski, j. (1997). *Postmodern dilemmas: Outrageous essays in art & art education*. Mahwah, NJ: Lawrence Erlbaum Associates.

jagodzinski, j. (1997). *Pun(k) deconstruction: Experifigural writings in art & art education*. Mahwah, NJ: Lawrence Erlbaum Associates.

jagodzinski, j. j. (1979). *Towards a new aesthetic*. Edmonton: University of Alberta, Department of Secondary Education.

jagodzinski, j. j., & University of Alberta. Dept. of Secondary Education. (1977). *Aesthetics, aesthetic education and art education*. Edmonton: Author.

jagodzinski, j. j., & University of Alberta. Dept. of Secondary Education. (1980). *Aesthetic consciousness and historical criticism*. Edmonton: Author.

Lather, P. A. (1991). *Getting smart: Feminist research and pedagogy with/in the postmodern*. New York: Routledge.

Lather, P. A. (1991). *Getting smart: Feminist research and pedagogy with/in the postmodern*. New York: Routledge.

Lather, P. A., & Smithies, C. S. (1997). *Troubling the angels: Women living with HIV/AIDS*. Boulder, CO: Westview Press.

Semeniuk, J., & Gould, A. (1990). *Safety basics: A generic guide for the development of a safety program within a small to medium sized construction company*. Edmonton: Alberta Construction Safety Association.

Shotter, J. (1993). *The cultural politics of everyday life.* Toronto, ON: University of Toronto Press.

Ventura, J., & Schunk, M. (1999). *Ventura/Schunk on student teacher ratios* [Online]. Available: http://www.jesseventura.org/taskforc/tf_paper.htm

APPENDIX A

FACULTY OF EDUCATION ETHICS REVIEW
LETTER OF CONSENT

Description of Project and Procedures of Observing Ethical Guideline

PLEASE PROVIDE 4 COPIES OF THIS DOCUMENT along with 1 COPY OF YOUR SUBMISSION TO THE GRANTING AGENCY AND 1 COPY OF ANY INSTRUMENTS TO BE USED.

Project Title: CTS Automotives Program Survey	
Applicants: Vincent Cullen	**Phone:** 916-9000 (cell) 438-6879 (home)
Department(s): Secondary Education	**Date:** September 23, 1999

- **Please describe the specific procedures to be used in observing ethical guidelines for research involving human participants.** References to the SSHRC Guidelines for research using human subjects are cited below. Researchers should also familiarize themselves with the more detailed discussion in Annex H of the Social Sciences and Humanities Research Council of Canada, *Research Grants: Guide for Applicants.* Some granting agencies adopt SSHRC guidelines; others have different guidelines that researchers must follow in making grant applications.

- **Statement of Research Problems and Methods.**

  I plan to interview most of the high school automotive CTS teachers. I will be travelling to each relevant school in the province to assist in administering the survey. Each survey will take about 20 to 30 minutes per teacher. My purpose is to identify aspects of these programs that have contributed to their success and to identify aspects that may be improved upon. In learning more about what teachers have to say about aspects of their own program or in CTS Automotives in general, we can possibly suggest ways in which schools, administrators, boards, and teachers may ensure continued success or improve the delivery of these CTS courses.

  These initial surveys will be part of a foundation for the doctoral candidacy paper that I will be preparing.

The focus of the survey is as follows:

- *School questions;*
- *Program questions;*
- *Staffing questions;*
- *Curriculum questions.*

Because I will be present when administering this survey to each teacher, I have worded each question as an interview question. I have designed this survey so as not to take too much of the teacher's time, though I have provided additional space after each question for elaboration.

➢ **Who are the participants and how will they be involved in your research?**

The participants are most of Alberta's high school CTS automotive teachers. They will be asked to complete a survey, which I will administer personally.

➢ **How will the nature and purpose of the research be explained to participants?** "Certain individual or collective 'rights' must be maintained. These include the right to know the precise nature and purpose of the research, so that consent may be given or withheld advisedly" (#8, p. 27).

I will explain that they have been invited to participate in a survey. They will be advised that this is part of my ongoing doctoral research. In addition, they will be provided with a written explanation and consent form (enclosed).

➢ **How will informed consent of participants be obtained?** "Informed consent should be obtained in writing. Where this is not practical, the procedures used in obtaining consent should be on record" (#14, p. 28). "Written consent should set out: a) purpose of the research; b) benefits envisaged; c) any inconveniences; d) tasks to be performed; e) rights of the subject, e.g. the right to withdraw without penalty, the right to confidentiality of personal information; f) risks involved; g) the name(s) of person(s), group(s) or institution(s) eliciting or receiving the consent" (#15, p. 28).

The participants will go over the written explanation and the consent form with me. They will understand and sign it before we complete the survey.

➢ **Are children, captive or dependent populations used? If so, detail how consent is to be obtained.** "Informed consent of parents of guardian and, where practical, of children should be obtained in research involving children" (#12, p. 28) "'Captive and dependent populations' are individuals or groups in a relationship where a power differential could operate to their disadvantage as subjects: for example, students, minors, prisoners, employees, military personnel, incapacitated people and the social deprived. . . . In addition to consent of the subjects themselves, informed consent of

the authorities should be obtained. . . . Captive subjects should always have the right and power to veto others' consent" (Introduction, #33, p. 29).

Not applicable.

- **How will provision be made for exercising the right to opt out at any time?** "Participants should understand that they may withdraw at any time, just as investigators may terminate their research in the interest of the subjects, the project or themselves" (#11, p. 28).

  Please see attached form.

- **How will confidentiality and anonymity be maintained?** "There should be a clear understanding between the investigator and subjects as to what extent information they divulge will be kept confidential in the original use of data and their deposit for future use. . . . Unless there is an explicit statement by the researcher to the contrary, to which the subject agrees, personal information given by the subjects will be confidential and the researcher will explain steps to be taken to ensure confidentiality and anonymity" (#28, 29, p. 29).

  Please see attached form.

- **Is deception and/or risk involved in the project? If so, how will the interests of the subject be protected?** "Deception is a situation in which subjects have essential information withheld and/or are intentionally misled about procedures and purposes . . . [and should only be used when] . . . a) significant advance could result; and b) no other methodology would suffice. . . . Deception should never be permitted when there is risk of harm to the subject or when it is not possible to advise subjects subsequently as to the reasons why the deception was necessary" (Intro. #18, 17, p. 28). "The onus is on the researcher to avoid or minimize risks to subjects both in carrying out the research and in publication of results. . . . Except where there is clear foreseeable benefit to the participant, such as in the therapeutic research, the researcher has no right to attempt to make long-term changes in a person's behavior or attitudes" (#23, 21, p. 28).

  Not applicable.

- **Are there any other procedures relevant to your observation of the ethics guidelines that are not described above? If so, please describe them and discuss how you intend to ensure that no ethical problems develop.**

  Not applicable.

CTS Automotive Program Survey

Rationale

As part of doctoral work at the University of Alberta, I am conducting research about High School Automotive CTS Programs in Alberta. My purpose is to identify aspects of these programs which have contributed to their success and to identify aspects which may be improved upon. In learning more about what teachers have to say about aspects of their own program or in CTS Automotives in general, we can possibly suggest ways which schools, administrators, boards and teachers may ensure continued success or improve the delivery of these CTS Modules.

Methodology

We will meet for approximately 20 to 30 minutes. We will go over the survey questions and answer them accordingly. I hope that you will ask questions, suggest recommendations and bring forth issues that you see as relevant and important.

Ethical Considerations

I will provide you with a copy of your survey on request. Anonymity is guaranteed to both you and your school. You can withdraw from the research project at any time, for any reason. The surveys will remain my property and will not be shared with anyone else. I do intend to submit a paper essay from this research to educational journals as yet undetermined. This is preliminary research to my doctoral candidacy proposal and subsequent dissertation.

____________________________ ____________________________

Mr. Vincent Cullen B.Ed., M.Ed. Date

Consent to Participate

In signing this form, I consent to participate in the survey of "CTS Automotives Programs Survey". I understand the nature and general purpose of the research procedure. The known risks have been explained to me by Mr. Vincent Cullen. I know that I may withdraw from the research at any time for any reason. I also can expect that my confidentiality will be protected.

____
Signature

____
Date

____
Print Name

June 21, 1999

Dr. M. David-Evans, Deputy Minister
Ministry of Learning
100 Jasper Avenue
Edmonton, Alberta

Dear Dr. David-Evans:

I am a doctoral student at the University of Alberta and my area of interests are the CTS Automotive courses. Specifically, I am trying to ascertain what may be done, if anything, to improve these programs. Some programs are closing while others are doing very well and expanding.

As I wish to survey the entire province, I am seeking research assistance to facilitate this process.

I intend to travel to each school that has an automotive program, interview staff through a prepared survey and accumulate data on facility and program structure. The estimated costs of travel, lodging, data accumulation and preparation is approximately $8,000 and would commence in September and be completed by December. If you could assist my research or suggest appropriate avenues for funding, I would be most grateful to you. On the basis of the analysis of data, I hope to identify positive aspects of specific programs and to suggest ways in which this area of the curriculum might be improved and expanded.

I would appreciate any comments and suggestions that you might have regarding my research proposal. Please feel free to contact either me at 780-916-9000 or my supervisor, Dr. George Buck, at 780-492-3572.

Sincerely,

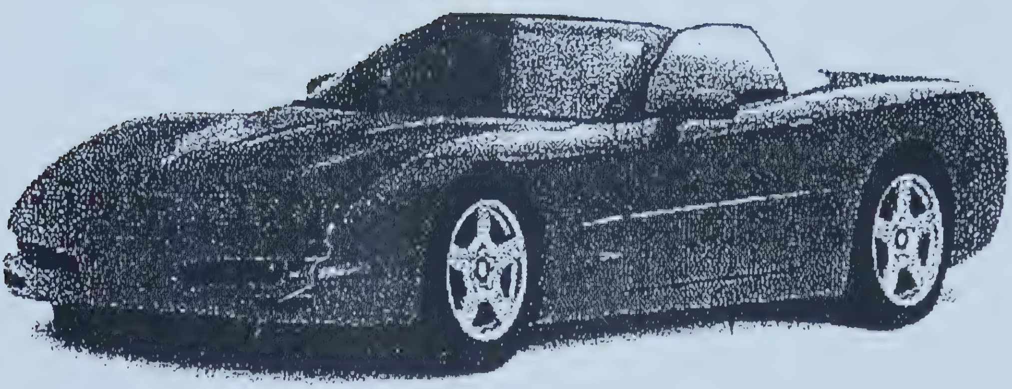
Vincent Cullen

APPENDIX B

CTS AUTOMOTIVES PROGRAM SURVEY

CTS
AUTOMOTIVES
PROGRAM

SURVEY



Prepared by

Vincent Cullen, B.Ed., M.Ed.

DIRECTIONS

Please review the questions first, then complete the attached survey. The purpose of this questionnaire is to verify the current state of Alberta's CTS Automotive Programs and to aid in developing resources for CTS Automotive Programs.

SURVEY

SURVEY MARKER:
Researcher notes only:

1. What percentage of shop work is customer service?

   __________% Approximately

   Comments/Explanation

   ____

   ____

   ____

2. How many shop vehicles does your school possess?

   #__________

   Comments/Explanation

   ____

   ____

   ____

3. How many students in your school are registered in Grades 10, 11 and 12 this school year?

   #__________ Approximately

   Comments/Explanations

   ____

   ____

   ____

4. How many students in your CTS Program?

   #__________ Approximately

   Comments/Explanation

   ____

   ____

   ____

5. How many CTS Teachers are delivering automotives courses at your school?

   #__________ Full-Time Approximately

   #__________ Part-Time Approximately

   Comments/Explanation

   ____

   ____

   ____

6. How many of those teachers possess Journeyman Mechanics Certificates?

   #__________

   Comments/Explanations

   ____

   ____

   ____

7. What is your highest teacher-student ratio in CTS Automotives specifically?

   _______:__1___ Approximately

   Comments/Explanations

   ____

   ____

   ____

8. What is your lowest teacher-student ratio in CTS Automotives specifically?

   ________:__1____ Approximately

   Comments/Explanation

   ____

   ____

   ____

9. What is your average teacher-student ratio in CTS Automotives specifically?

   ________:__1____ Approximately

   Comments/Explanations

   ____

   ____

   ____

10. Does your CTS Automotives Program have an aide?

    ❑ Yes ❑ No

    Comments/Explanations

    ____

    ____

    ____

11. What percentage of your CTS classes require you to teach two or more modules/courses simultaneously?

    ___________ Approximately

    Comments/Explanations

    ____

    ____

    ____

12. How many shop bays does your auto shop area have?

____

Comments/Explanations

____

____

____

13. How would you rate the general condition of the shop equipment your auto-program has?

Excellent		Average		Poor
❑	❑	❑	❑	❑

Comments/Explanations

____

____

____

14. How would you rate the amount of equipment your school has to deliver your program?

Excellent		Average		Poor
❑	❑	❑	❑	❑

Comments/Explanations

____

____

15. In one year, your school's CTS Automotive Program would have a student completing how many CTS modules/courses?

#____________ Approximately

Comments/Explanations

____

____

____

16. How many CTS modules/courses outside automotives are offered in each school year?

#___________ Approximately

Comments/Explanations

____

____

____

17. How would you rate your school's tracking process of CTS Modules/courses?

Excellent		Average		Poor
❑	❑	❑	❑	❑

Comments/Explanations

____

____

____

18. How much is your CTS Automotives Programs yearly budget?

$________________ Approximately

Comments/Explanations

____

____

____

19. What extra money, if any, does your CTS Automotives Department create in a given year?

$________________ Approximately

Comments/Explanations

____

____

____

20. Please check any of the following extra-curricular items your school's programs offer:

	YES	NO
School Race Car	❑	❑
Rap Program	❑	❑
Auto Work Experience	❑	❑
AMA/FORD Student Auto Skills	❑	❑
Automotive Jackets, etc	❑	❑

Other ____

Comments/Explanations

____

____

____

21. When timetabling, are your automotive students scheduled for the year or ½ year automotive modules?

❑ Year ❑ ½ Year ❑ Other (explain)

Comments/Explanations

____

____

____

22. Does your program have the necessary flow charts of modules for students to achieve articulation in automotives?

❑ Yes ❑ No

If yes, how many this year #____________Approximately

Comments/Explanations

____

____

____

23. What text book(s) are you presently using?

A)____________________________

B) ____________________________

C) ____________________________

Comments/Explanations

24. What percentage of students could possess their own text book?

__________% Approximately

Comments/Explanation

25. Were you teaching the older 10, 22 ABC, 32 ABC Program?

	YES	NO
Teacher 1	❑	❑
Teacher 2	❑	❑
Teacher 3	❑	❑

Comments/Explanation

26. How would you rate the change over process?

Excellent Average Poor

❑ ❑ ❑ ❑ ❑

Comments/Explanation

____

____

____

27. If you were to rate the student who completed the older ABC Type Program as <u>10</u>, how would you now rate a student who has completed the three years of CTS Modules?

____________/10 Approximately

____

____

____

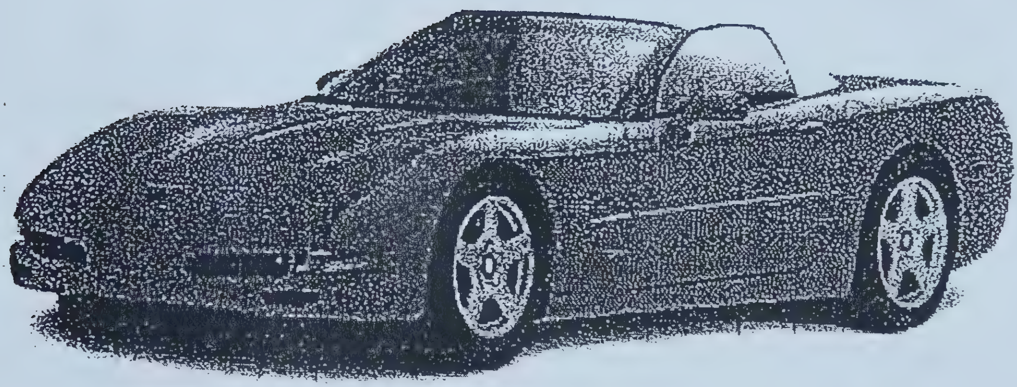
Each of these survey questions will then be separated, and all responses to each question will be displayed, tallied, or averaged to best inform the reader of each question's significance.

APPENDIX C

CTS AUTOMOTIVES PROGRAM SHOP OBSERVATION

CTS
AUTOMOTIVES
PROGRAM

SHOP OBSERVATION



Prepared by
Vincent Cullen, B.Ed., M.Ed.

School # ________

Shop Observation

1. Coverall policy?

   None ❑ Rent ❑ Lease ❑ School purchase ❑ Student Purchase ❑

   Comments/Explanation

   ____

   ____

   ____

2. Shop Doors?

   Number ____ Electric ____ Windowed ____ Safety Stopped ____

   Comments/Explanation

   ____

   ____

3. Windows?

   On Doors ❑ Yes ❑ No

   Natural Light ❑ Yes ❑ No

   Comments/Explanation

   ____

   ____

   ____

4. Stalls

   Number ______ Pit _____

   Comments/Explanation

   ____

   ____

   ____

5. Noise?

   ❑ Echo ❑ Music ❑ Furnace ❑ Compressor

   Comments/Explanation

   ____

   ____

   ____

6. Classroom?

   ❑ In shop ❑ Out shop ❑ Large ❑ Small ❑ Shared class

   Comments/Explanation

   ____

   ____

   ____

7. Hoists?

   Drive on In floor 2-Poster

   ____ ____ ____

   Comments/Explanation

   ____

   ____

   ____

8. Floors?

❑ Safety Lines ❑ Drains

Comments/Explanation

____

____

____

9. Bathroom?

❑ In shop ❑ Out shop ❑ Far, hallway

Comments/Explanation

____

____

____

10. Lockers?

❑ In shop ❑ Shared ❑ Out shop ❑ Far, Hallway

Comments/Explanation

____

____

____

11. Compound?

❑ Yes ❑ Non heated storage ❑ Clean

Comments/Explanation

____

____

____

12. Lighting?

❑ Dim ❑ Missing ❑ Burnt out

Comments/Explanation

____

____

____

13. Others?

❑ Low Roof

Comments/Explanation

____

____

____

14. Cleanliness?

Custodian cleans shop ❑ Yes ❑ No

Ceiling ❑ Yes ❑ No

Floors ❑ Yes ❑ No

Walls ❑ Yes ❑ No

Equipment ❑ Yes ❑ No

Tools ❑ Yes ❑ No

Comments/Explanation

____

____

____

15. Storage?

❑ Mezzanine ❑ Storage room

Comments/Explanation

____

____

____

16. Safety issues?

❑ Clearly seen eye wash ❑ Cars to class ❑ Car to desks ❑ Cars turn in shop ❑ Car to office ❑ Fire exits ❑ Fire equip. ❑ First aid ❑ Clearly seen power buttons

Comments/Explanation

____

____

____

17. Equipment

❑ Clean ❑ Not clean ❑ Old ❑ New

Comments/Explanation

____

____

____

18. Tools?

Complete ❑ Yes ❑ No ❑ Portable cases boards ❑ Crib

❑ Show wall-boards

Comments/Explanation

____

____

____

19. Visual?

☐ Organized

Comments/Explanation

____

____

____

20. Smell?

☐ Grease ☐ None ☐ Wash Bay ☐ Other _______________

Comments/Explanation

____

____

____

21. Office?

☐ Small ☐ Large ☐ Organized

Comments/Explanation

____

____

____

APPENDIX D

SELECTED AUTOMOTIVE PROGRAM HANDOUTS

Student Information Form

USE: This form is given to the students at the beginning of the course. It provides many time-saving data on the students that the teacher may require during the courses.

BENEFIT: Quick reference on contact phone numbers
Medical information about student
Text bar code information to verify student has the correct text
Timetable of student to locate him/her during the school day
Signed student safety pledge

YOUR HIGH SCHOOL
CTS AUTOMOTIVES

Student Information

NAME: ______________ **YEAR:** ____________ **COURSE:** ____________
Please print

Parent/Guardian phone #'s: **DATE:** ______________

Name: ____________________ **Textbook Barcode #:** __________

Phone #'s: Home: ________________

Work: ________________ **SIGNATURE:** ______________

DOB ______________ **AHC #** ___________ **Medical Alert** ____________

Medical Conditions

Parent or Guardian Emergency Contact (Relationship)

DATE	COMMENTS	INITIAL

Student Timetable

Schedule				Schedule		
Block	Course	Room		Block	Course	Room
A1				B1		
A2				B2		
C1				D1		
C2				D2		

PERSONAL PRACTICES AND CONDUCT

Accident prevention is up to you. There are certain basic rules of conduct that you should incorporate in your daily activities. These rules all involve your attitude towards your fellow workers as well as your attitude towards your task at hand. People with a poor job attitude are those that most frequently have accidents.

Orderliness is a desirable quality. Safe workers will have a methodical approach to the job. They will lay tools out neatly so that they are able to approach their task in an orderly manner. They will not clutter up their work area with excessive tools and materials.

A safe worker is a clean worker. Messy jobs require continual clean up of the work area and frequently of the worker as well.

STUDENT SAFETY PLEDGE

It is understood that each student will be given proper instruction, both in the use of equipment and in the correct safety procedures concerning it, before being allowed to operate it alone. The student must assume the responsibility for following safe practices, and we therefore ask that the students subscribe to the following safety pledge:

1. I promise to follow all safety rules for the CTS area;
2. I promise to never use a machine without first having permission from my instructor;
3. I will not ask for permission to use a particular machine unless I have been instructed in its safe operations; and
4. I will report <u>all</u> accidents or injuries to my teacher immediately.

____________________ ______________________________

DATE **STUDENT'S SIGNATURE**

Student Work Report Form

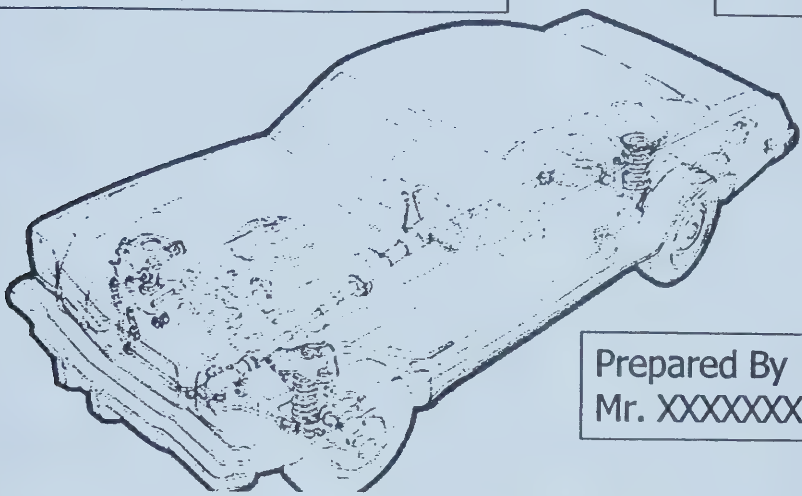
USE: This form is given to the students at the beginning of the course. It provides a time-saving way of daily evaluating the student's performance.

BENEFIT: Quick reference on student overall grade in the course
Efficient way to do daily evaluation as the student does most of the administrative tasks while the teacher assesses and provides a grade of 1 to 5. Criteria are posted on classroom and shop walls.
Students can show parents the work they have done and their grades
Students soon realize that to make up a missed class takes the same time allotment as on the day the were absent. They are rarely absent.
This process shows a direct grade relationship with attendance. Parents appreciate the detailed effort of the student and the teacher.
When a students have done nothing in a class, they can write down only that they did nothing, and they assess themselves accordingly. The teacher signs off on the work report and then assigns an incident report on such behavior to go home to the parents.

Your School CTS Automotive Work Report

Name: ____________
Class: ____________
Block: ____________

/100%



Prepared By
Mr. XXXXXXXXXX

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished: ____________________
____
____
Tool: __________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished: ____________________
____
____
Tool: __________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished: ____________________
____
____
Tool: __________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished: ____________________
____
____
Tool: __________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Date: Evaluation: /5
Started: ☐ Prepared: ☐ Cleaned Up: ☐
Accomplished:____________________

Tool: ________ Use: __________

Student Tracking Form

USE:	This form is given to the students at the beginning of the course. It provides a means of determining where the student is in the program.
BENEFIT:	Quick reference for the teacher and the student Any future course accreditation can be referenced to what the students wrote and understood that they had taken previously.

STUDENT TRACKING

Name: ______________________________ **Student ID:** __________________

GRADE 10

COURSE NAME	CODE	TEACHER	YEAR	SEM

GRADE 11

COURSE NAME	CODE	TEACHER	YEAR	SEM

GRADE 12

COURSE NAME	CODE	TEACHER	YEAR	SEM

Student Perception Survey

USE: This survey is given to the students near the end of the course. It provides the reader with the students' perceptions of teacher effectiveness.

BENEFIT:
Possible professional development indicator
Identification of the teacher's teaching style
Complement any administrative perception survey
Aid the teacher in understanding how the students view him or her
Aid the teacher in making changes in program delivery

STUDENT PERCEPTION OF TEACHER AND THE AUTOMOTIVE PROGRAM

Teacher's Name: ______________ Course: __________ Period: ______ Date: _________

		Not applicable	Yes	Somewhat	No	Undecided
1.	The teacher is prepared for class.					
2.	The teacher uses class time effectively.					
3.	The teacher uses shop time effectively.					
4.	The teacher expects me to use the entire class time effectively.					
5.	The teacher encourages me to succeed.					
6.	The teacher discourages misbehaviour.					
7.	The teacher expects me to be on time for class.					
8.	The teacher begins class on time.					
9.	The teacher expects me to attend all classes.					
10.	The teacher provides note taking/examples/demonstrations/handouts that add to student achievement.					
11.	The teacher creates a positive learning atmosphere.					
12.	The teacher makes the course interesting.					
13.	The teacher is enthusiastic about the subject.					
14.	The teacher has a good knowledge of the subject.					
15.	Lessons are presented at a level I can understand.					
16.	Lessons are presented in a clear and logical manner.					
17.	The assignments given to me in this course are reasonable.					
18.	Student assignments are returned within a reasonable amount of time.					
19.	The teacher is courteous and respectful.					
20.	The teacher displays a good balance between firmness and compassion.					
21.	The teacher makes it clear to me what ideas, concepts, or activities will be tested or graded.					
22.	Are shop hand tools readily available when required for this course.					
23.	Is the shop equipment in safe condition for this course.					
24.	Is the shop equipment present in sufficient numbers for the amount of students in class.					

		Not applicable	Yes	Somewhat	No	Undecided
25.	Was there sufficient customer service work available in the course you have taken.					
26.	Was there sufficient shop vehicles or parts available for the course you have taken.					
27.	Do parts arrive in a reasonable time.					
28.	Are student class sizes too large for the course you have taken.					
29.	Would you recommend this course you have taken to other students.					
30.	Did you find the amount of theory in this course sufficient as compared to the amount of practical shop work.					

1. What are the teacher's most obvious strengths?

____

____

____

2. What are the program's most obvious strengths?

____

____

____

3. Are there areas for improvement that you feel the teacher should consider?

____

____

____

4. Are there areas for improvement that you feel would improve the program, class and shop?

____

____

____

5. Does the program provide sufficient opportunity for you to learn the concepts in this course?

____

____

____

6. The teacher does a good job of teaching this course (Check one).
   ☐ Strongly Agree ☐ Agree ☐ Disagree
   ☐ Undecided ☐ Strongly Disagree

Missing Assignment Form

USE: To efficiently aid students in understanding that missing assignments have consequences and which assignments are missing.

BENEFIT: Quick and efficient way to list missing assignments
Future reference for students
Students can be efficiently directed to the form then they ask the teacher
Establishes a consistent set of consequences when assignments are missed
Aid the reader in determining the study habits of the student
The student does most of the administrative duties rather than the teacher
Teacher can check off boxes on the form for parent follow-up, etc.
All those involved sense the high level of customer service and tell others
Parents appreciate the attempt to work with the parent on guiding the student as necessary

NOTE: Make it in a duplicate style to keep one as a record in the teacher's class binder. The other copy goes to the students and/or parents.

MISSING ASSIGNMENTS
OR PROJECTS

Name:________________________ **Date:**________________________

Missing assignments can greatly affect a student's progress and grades. The following are missing:

1. ____
2. ____
3. ____
4. ____
5. ____

Please explain why these are missing and what you are going to do to complete what is missing:

____

____

____

____

____

☐ If this box is checked off, please discuss these missing assignments with your parents and have them acknowledge by signing below.

Parent's Name: ______________________________

Parent's Signature: ___________________________

☐ If this box is checked off, a parent is requested to phone Mr. Vincent Cullen at school (555) 555-5555 ext. 555

Your co-operation is appreciated.

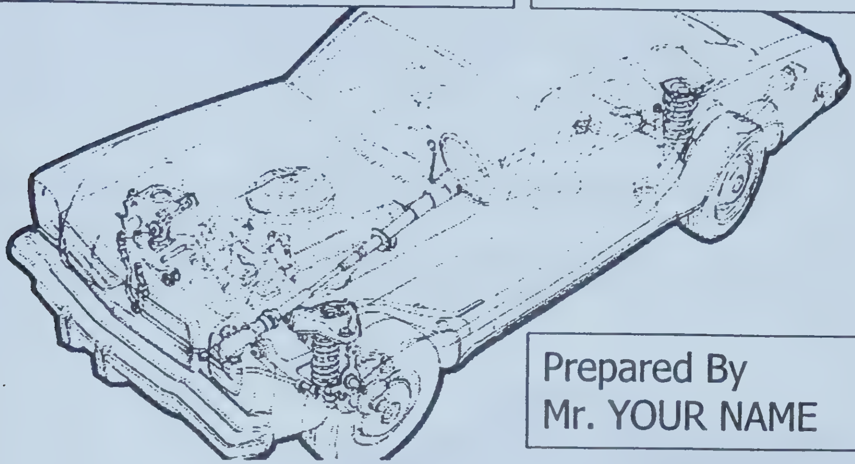
Mr. Vincent Cullen
CTS Automotives

Program Course Outline

USE:	This outline is given to the students at the beginning of the course. It provides the student with the necessary information to understand what topics the course will cover and what administrative information is important to the student to establish course continuity and to begin to suggest student expectations.
BENEFIT:	Future reference for students Students can be efficiently directed to the outline when they ask the teacher Establishes a consistent set of answers to commonly asked questions Aids the teacher in making changes in the program

YOUR SCHOOL
CTS Automotives
Auto 10 Outline

6 Credit Course



Prepared By
Mr. YOUR NAME

*Special notes of the rules and obligations of being a student in this program.

"Automotive mechanics can be dangerous". It is for this reason that special unique rules and student obligations exist.

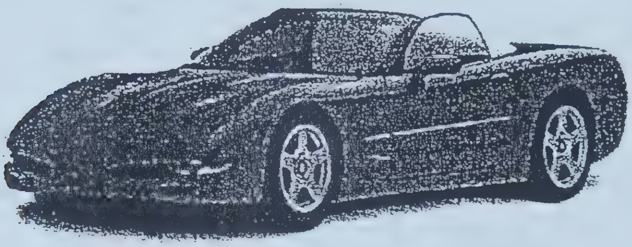
1 No food or drinks in the automotive shop or classroom.
2 No valuables are to be brought into class; coats, walk-mans, cigarettes, lighters etc. as they cannot be supervised and protected in such a large shop area.
3 Students are to leave books, pens and coveralls in the shop locker unless permission is given to remove them from the automotive area.
4 A professional student example must be exhibited at all times as customers are frequently present.
5 Before operating any vehicle related to the schools program a photocopy of those students valid driver's license must be on file with the instructor.

Each module has a value of one credit:

Personal & Shop Safety	CTR 1210 = 1 Credit
Vehicle Service & Care	MEC 1020 = 1 Credit
Engine Fundamentals	MEC 1040 = 1 Credit
Mechanical Systems	MEC 1130 = 1 Credit
Ride & Control Systems	MEC 1150 = 1 Credit
Pneumatics & Hydraulics	MEC 1110 = 1 Credit
	TOTAL = 6 Credits

Marks for each module will be based on:

50% Theory = Notebook check, tests, classroom labs.
50% Practical= A mark will be assigned daily in the shop of work performed.



There are **no prerequisites** for this 10 level course.

This grade 10 level program has been designed to provide you with an opportunity to gain an understanding of the working of a customer-service based shop and the general workings of the subsystems in an automobile. As in industry, safety is one of the most important aspects to be modelled in a successful automotive shop.
Course objectives will be posted for this course and individual copies will be available from the instructor. Attendance and student participation is essential to become proficient and achieve the course objectives. If you can prove an absence is excused you then have the responsibility of contacting the instructor the day you return to school to arrange an opportunity to complete the missed test or assignment. Failure to do this will result in you earning a zero grade for that assignment.
***Please understand and be knowledgeable of the sequence of the flowchart on the following page and that many of them are prerequisites for the next year's courses.**

YOUR SCHOOL AUTOMOTIVE PROGRAM FLOW CHART

YOUR SCHOOL AUTOMOTIVE PROGRAM FLOW CHART

INTRODUCTION 10
Grade 10

- Safety & Shop Practices CTR 1210
- Vehicle Service & Care MEC1020
- Engine Fundamentals MEC1040
- Mechanical Systems MEC1130
- Ride & Control System MEC1150
- Pneumatics and Hydraulic MEC1110

6 (Credits) Format

Prepared by: YOUR NAME

October 15, 1999or New Date

INTERMEDIATE 20
Grade 11

- Braking System MEC2110
- Power Trains MEC2130
- Manual Transmissions & Transaxles MEC2140
- Suspension Systems MEC2150
- Steering Systems MEC2160
- Alternative Fuel Engines MEC2050
- Lubrication & Cooling Systems MEC2030
- Fuel & Exhaust Systems MEC2040
- Ignition Systems MEC2060
- Electrical Fundamentals MEC1090
- Electrical Components MEC2090
- Vehicle Detailing MEC2010

ADVANCED 30
Grade 12

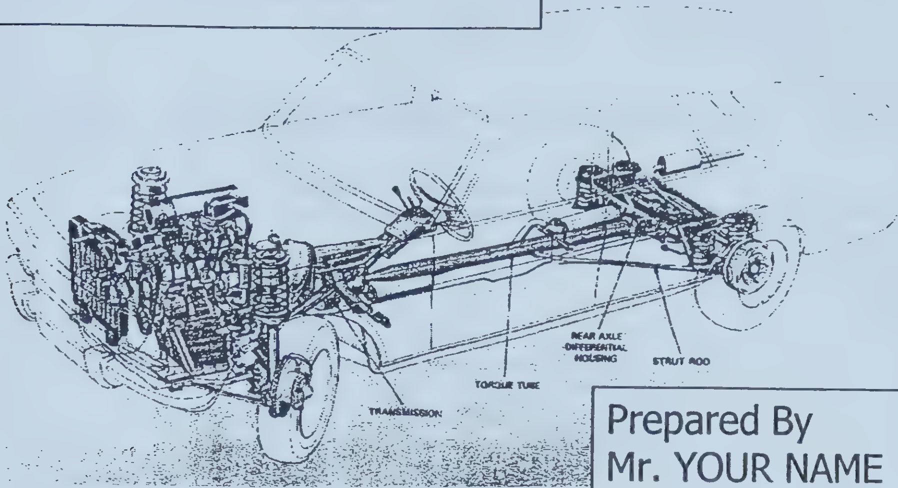
- Wheel Alignment MEC3150
- Wheel Alignment Project CTR3120
- Drive Train Repair MEC3140
- Standard Transmission Project CTR1120
- Rear Axle & Differential Project CTR3140
- Buying & Selling MEC3010
- Engine Performance Diagnosis MEC3030
- Engine Tune-Up MEC3040
- Engine Removal & Installation MEC3050
- Engine Reconditioning I MEC3060
- Engine Reconditioning II MEC3070
- Alternative Energy System MEC3080

ARTICULATION
Grade 11 and 12

- Safety Systems MEC 3100
- Structures & Materials MEC1160
- Hydraulic Accessories MEC2120
- Brake Project CTR2110
- Vehicle Maintenance MEC2020
- Vehicle Value Appraising MEC3020
- Engine Component Project CTR3130
- Automatic Transmissions MEC3130
- Emission Controls MEC2070
- Power Assisted Accessories MEC2100
- Computer Systems MEC3090
- Future Vehicles CTR2110

YOUR SCHOOL
CTS Automotive
Auto 20 Outline

6 Credit Course



Prepared By
Mr. YOUR NAME

*Special notes of the rules and obligations of being a student in this program.

> **"Automotive mechanics can be dangerous". It is for this reason that special unique rules and student obligations exist.**

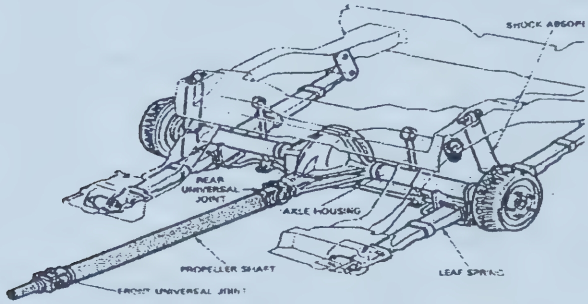
1. No food or drinks in the automotive shop or classroom.
2. No valuables are to be brought to class; coats, walk-mans, cigarettes, lighters etc. as they cannot be supervised and protected in such a large area.
3. Students are to leave books, pens and coveralls in the shop locker unless permission is given to remove them from the automotive area.
4. A professional student example must be exhibited at all times as customers are frequently present.
5. Before operating any vehicle related to the schools program a photocopy of that students valid drivers license must be on file with the instructor.

Each module has a value of one credit:

Braking Systems	MEC 2110 = 1 Credit
Power Trains	MEC 2130 = 1 Credit
Manual Trans and Transaxles	MEC 2140 = 1 Credit
Suspension Systems	MEC 2150 = 1 Credit
Steering Systems	MEC 2160 = 1 Credit
Alternative Fuel Engines	MEC 2050 ~~= 1 Cred~~it
	TOTAL = 6 Credits

Marks for each module will be based on:

50% Theory = Notebook check, tests, classroom labs.
50% Practical= A mark will be assigned daily in the shop of work performed.



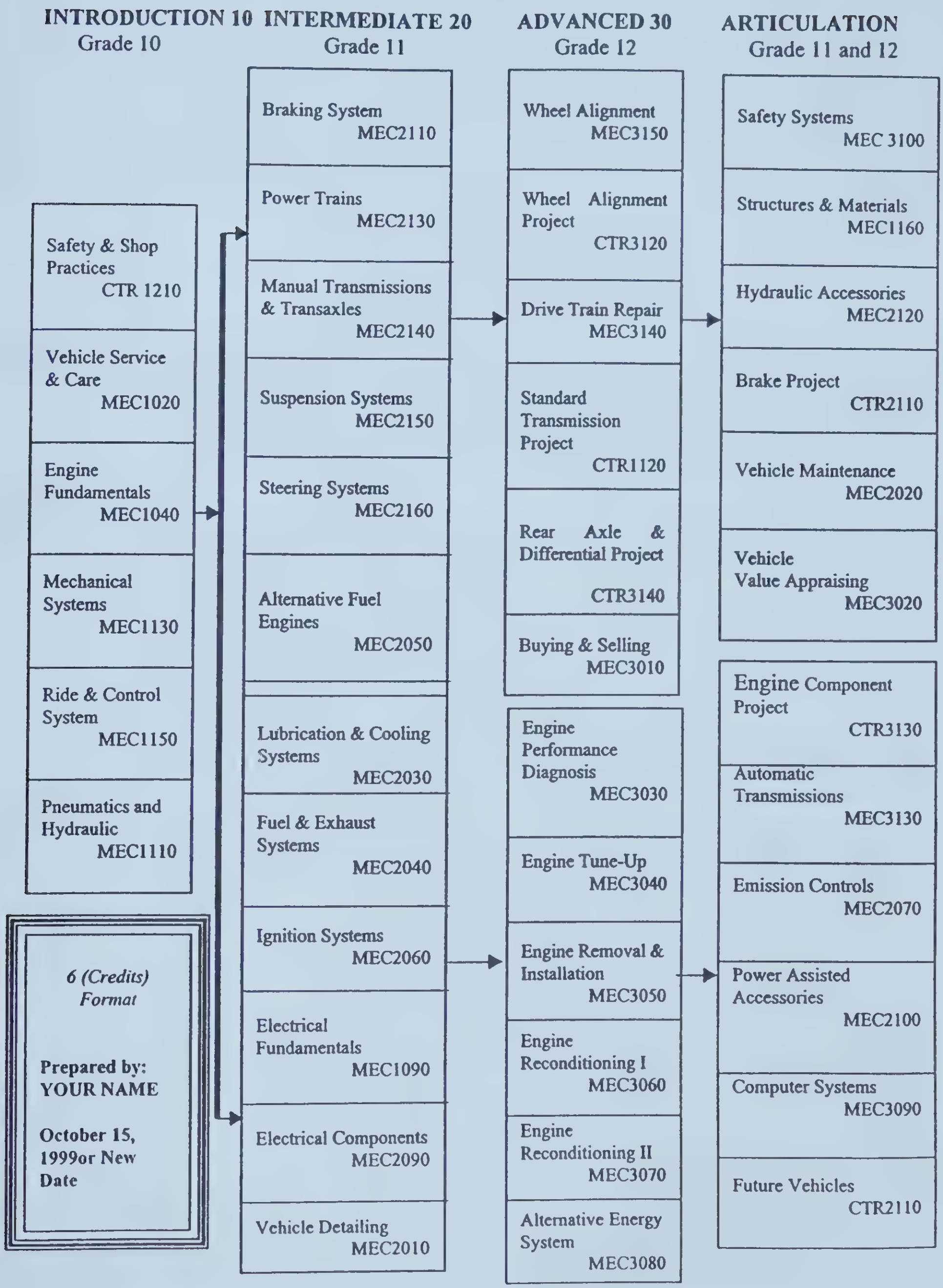
There are **prerequisites** for this 20 level course. They are: Safety(CTR1210), Mechanical Systems (MEC1130, Ride & Control Systems (MEC1150)

This grade 20 level program has been designed to provide you with an opportunity to gain an understanding of the working of a customer-service based shop and the general workings of certain subsystems in an automobile. As in industry safety is one of the most important aspects to be modelled in a successful automotive shop.

Course objectives will be posted for this course and individual copies will be available from the instructor. Attendance and student participation is essential to become proficient and achieve the course objectives. If you can prove an absence is excused you then have the responsibility of contacting the instructor the day you return to school to arrange an opportunity to complete the missed test or assignment. Failure to do this will result in you earning a zero grade for that assignment.

***Please understand and be knowledgeable of the sequence of the flowchart on the following page and that many of them are prerequisites for the next year's courses.**

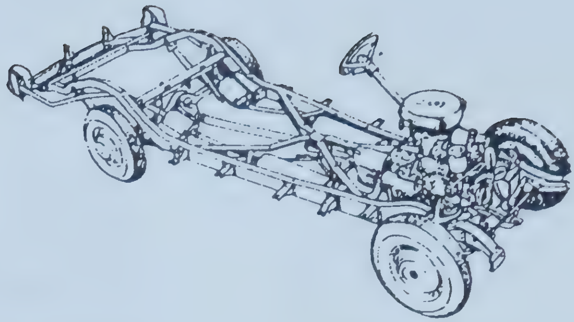
YOUR SCHOOL AUTOMOTIVE PROGRAM FLOW CHART



Customer Service Evaluation Survey

USE:	This survey is given to the customer with the paid receipt. The customer's comments are posted on a wall to indicate the high level of customer service performed in the program. It provides the reader with the customer's perceptions of the program's effectiveness.
BENEFIT:	This form aids in generating future customer service work for the program Students sense the relationship to the customer and the contribution to the community Complements any administrative perception survey of the program Aids the teacher in determining the successfulness of the student and the program Aids the teacher in making changes in program If you receive customer complaints, they can view the wall of evaluations All those involved know that customer dissatisfaction is not a common occurrence Students read the wall of evaluations and accept a higher level of customer service

EVALUATION



Greetings from the CTS Automotive Department.

It is important to get your feedback on our services as we want to establish our program as being one of the best in the city. Please be kind where we excelled and please indicate where even the slightest improvement could be made to better serve our customers.

How easy was it to book your car into the shop? ☐ Very Easy ☐ Easy ☐ Not Applicable ☐ Needs Improvement ☐ See My Suggestions on Back
If an estimate was required, did you okay the repairs they were started? ☐ Yes ☐ Not Applicable ☐ No ☐ See My Suggestions on Back
If asked about the level of customer service that you received, would you indicate that we: ☐ Outstanding Value ☐ Adequate Value ☐ Not Applicable ☐ Higher Level of Service Required to Recommend the YOUR SCHOOL Auto Shop ☐ See My Suggestions on Back
Other comments that you feel might add to the service provided in the future:

You can reach me by e-mail at *YOUR E-MAIL*, phoning me at 555-5555 extension 555, or by visiting us at the school shop. Or you can just drop this form in my mailbox at the office once it's completed.

Sincerely,

YOUR School
Mr. YOUR NAME
and CTS Automotives Students

Oil Change Service Form

USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The student can then indicate on their daily work report what tasks of the service they have preformed to request a grade of their demonstrated work in the particular area

BENEFIT:
Quick and efficient way to set a standard of customer service
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions
Aids the reader in making changes in the oil change service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customers and helps them understand the level of service indicated
The customer reads the names of the student who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others

Year: _____ Make: _________ Model: ________

OIL CHANGE SERVICE

INITIALS

STEPS — NOT REQUIRED

1. ________ ☐ Check air filter
2. ________ ☐ Order oil filter and parts
3. ________ ☐ Drain oil and torque plug to 20 ft. lbs.
4. ________ ☐ Lubricate "o" ring and install new filter to proper hand torque
5. ________ ☐ Add initial oil ??? #________
6. ________ ☐ Run and top-up oil level
7. ________ ☐ Windshield sticker with 4,500 additional kms
8. ________ ☐ Tire pressures
9. ________ ☐ Check washer level
10. ________ ☐ Check brake fluid level and condition
11. ________ ☐ Check P/S level
12. ________ ☐ Check antifreeze condition and strength

Before _,_ _ _,_ _ _
ADD 4,500
Sticker _,_ _ _,_ _ _

LF lbs___ RF lbs___ Set all four to:
LR lbs___ RR lbs___

– C

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.
Other worker comments:

____
____
____
____

Incident Report Form

USE: To efficiently aid students in understanding that there are consequences and to detail questionable events that take place in the shop or classroom. Have the student complete away from the shop or class in a private area.

BENEFIT:
Quick and efficient way to document an event
Future reference for all those involved
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of consequences when events take place
Aids the reader in determining the study habits of the student
This form has the student do most of the administrative duties rather than the teacher
The teacher can check-off boxes on the form for parent follow-up, etc.
All those involved sense the high level of consistency of consequences and tell others
Students are asked to write in their daily work report that an incident form was completed
Parents appreciate the attempt to work with them on guiding the students as necessary

NOTE: Make it in a duplicate style to keep one as a record in the teacher's class binder. The other copy goes to the students and/or parents.

INCIDENT REPORT
CTS AUTOMOTIVES

Complete all sections listed below:

Name:______________________________ Date:_____________ Time:______

Describe in detail what took place:

____

____

____

____

____

Describe in detail what you will do different next time:

____

____

____

____

____

☐ If this box is checked off, a parent must read and sign.

Parent's Name: __________________________
Parent's Signature: _______________________

☐ If this box is checked off, a parent is requested to phone Mr. Vincent Cullen at the school: (555) 555-5555, ext 555.

Your co-operation is appreciated.

Mr. Vincent Cullen
CTS Automotives

How Is Your Car? Work Request Form

USE: This form is given to the students, school staff, board office, other schools that do not have automotive programs, and community groups periodically throughout the year. It provides an efficient way of soliciting customer service work for the student in the automotive program as well as promoting the automotive program within the community in a positive way. This is also a very good way to involve the staff of the feeder schools in being aware of the high school automotive program.

BENEFIT: Quick reference on contact phone numbers of customer service work
Students distribute, collect, and sort the completed forms
The teacher and students select the completed forms for each class when shop work is required
This way of recruiting service work adds to the perception of a high level of customer service
These forms can be prioritized: students, then school staff, then general public
Teacher can stockpile certain work for courses that are hard to find customer service vehicles

HOW IS YOUR CAR?

Greetings from the CTS Automotive Department

CTS shop work scheduling is sometimes difficult. Attempting to match specific repairs exactly when the students need to demonstrate hands on work is sometimes difficult. To help us out, please indicate what work you suspect your car may require and when you would like us to work on it.

	Anytime During This Semester	Requested Date
Wash		**, 2000**
Interior Clean		**, 2000**
Oil Change and Service		**, 2000**
Vehicle Inspection		**, 2000**
Shock Absorbers		**, 2000**
Engine Shampoo		**, 2000**
Tires		**, 2000**
Tire Balance/Rotation		**, 2000**
Headlight alignment		**, 2000**
Other		**, 2000**
Other		**, 2000**
Year:	**Make:**	**Model:**
Your name:		**Extension #:**

You can reach me by e-mail at *YOUR NAME@XXXXXX*, phoning me at 555-5555, or by visiting us at the shop. Or you can just drop this form in my mailbox once it's completed.

Sincerely,

Your School CTS Automotives
Mr. YOUR NAME

General Check Service Form

USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The student can then indicate on their daily work report what tasks of the service they have preformed to request a grade of their demonstrated work in the particular area. This form is an excellent way finding vehicles that need repair and it also benefits the customer as it provides a means of indicating when certain repairs made be required.

BENEFIT: Quick and efficient way to indicate to potential customers the condition of their vehicles
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions by students and customers
Aids the reader in making changes in the General Check service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customers and helps them understand the level of service indicated
The customer reads the names of the student who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others
Customer understands that the car's brakes are 45% worn and to arrange a distant future booking
Customers understand that this is a check and estimate only

Year: ______ **Make:** ______ **Model:** ______

GENERAL CHECK PAGE 1

INITIALS

STEPS		**NOT REQUIRED**	
1.	________	❑	Check air filter
2.	________	❑	Tire condition
3.	________	❑	Engine shampoo
4.	________	❑	Antifreeze condition ☐PASS ☐FAIL ,and strength -__C
5.	________	❑	Belts and hoses and fluid levels ________________
6.	________	❑	Battery load test ☐PASS ☐FAIL
7.	________	❑	Battery and terminal condition ☐PASS ☐FAIL
8.	________	❑	Tire pressures
9.	________	❑	Shocks ________________.
10.	________	❑	Headlight alignment
11.	________	❑	Headlights, marker-lights and brake lights
12.	________	❑	Wiper blades ______% worn

Tire condition:

LF __% RF __% Worn ☐ Rotation needed

LR __% RR __% Worn ☐ Balance needed

Tire pressures:

LF __ lbs RF __ lbs

LR __ lbs RR __ lbs

Set all four to: ☐

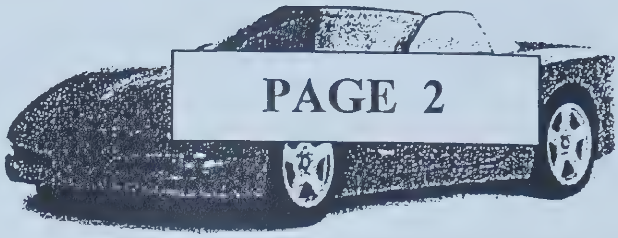
NEXT PAGE

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.

Year: _____ **Make:** ________ **Model:** ________

GENERAL CHECK PAGE 2



INITIALS

STEPS **NOT REQUIRED**

13.__________ ❑ Check for oil leaks ____________________________

14.__________ ❑ Check exhaust system ___________________________

15.__________ ❑ Wheel alignment based on tire wear

16.__________ ❑ Front suspension and steering __________________

17.__________ ❑ Front wheel bearing lubrication

18.__________ ❑ Front wheel bearing adjustment

19.__________ ❑ Brake condition passenger side Front ____% Rear____% Worn

20.__________ ❑ Check all accessories ___________________________

Other comments about vehicle condition

____

____

____

____

____

____

____

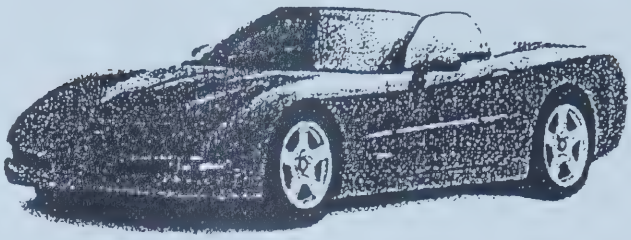
Engine Detail Service Form

USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The students can then indicate on their daily work report what tasks of the service they have performed to request a grade of their demonstrated work in the particular area.

BENEFIT: Quick and efficient way to indicate to a customer the work performed on their vehicle
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions by students and customers
Aids the reader in making changes in the General Check service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customers and helps them understand the level of service indicated
The customer reads the names of the students who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others

Year: _____ **Make:** ________ **Model:** ________

ENGINE DETAIL SERVICE



STEPS	INITIALS	NOT REQUIRED	
1.	__________	☐	Spray on shampoo and leave on for 20 minutes
2.	__________	☐	Rinse engine compartment
3.	__________	☐	Paint and detail compartment
4.	__________	☐	Lubricate hood hinges and latch
5.	__________	☐	Silicone engine compartments

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.

Other worker comments:

____

____

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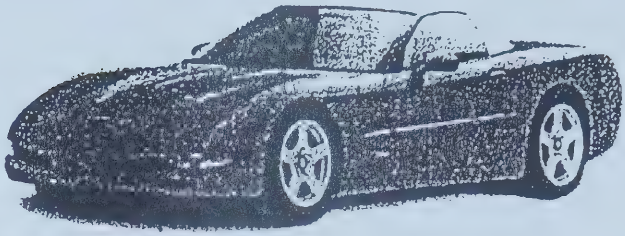
Detail Service Form

USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The students can then indicate on their daily work report what tasks of the service they have preformed to request a grade of their demonstrated work in the particular area.

BENEFIT:
Quick and efficient way to set a standard of customer service
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions
Aids the reader in making changes in the Detail Service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customer and helps them understand the level of service indicated
The customer reads the names of the student who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others

Year: _____ **Make:** ________ **Model:** ________

DETAIL SERVICE



INITIALS / **STEPS** / **NOT REQUIRED**

1. __________ ❑ Empty and clean ashtrays and compartments
2. __________ ❑ Clean trunk as necessary
3. __________ ❑ Vacuum mats and interior
4. __________ ❑ Hand clean all door sills
5. __________ ❑ Soap, brush, shampoo carpets
6. __________ ❑ Soap, brush, pressure wash mats
7. __________ ❑ Hand clean all interior panels
8. __________ ❑ Hand clean all interior windows and mirrors
9. __________ ❑ Install air freshener to carpets
10. __________ ❑ Install mats and belongings to car
11. __________ ❑ Apply tire conditioner

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.
Other worker comments:

____
____
____
____

Wash Service Form

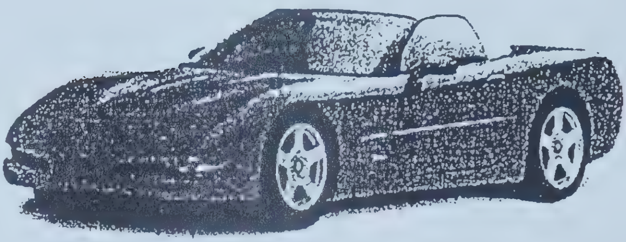
USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The students can then indicate on their daily work report what tasks of the service they have preformed to request a grade of their demonstrated work in the particular area.

BENEFIT: Quick and efficient way to indicate to a customer the work preformed on their vehicle
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions by students and customers
Aid the reader in making changes in the Wash Service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customer and helps them understand the level of service indicated
The customer reads the names of the students who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others
Students understand the value of a cleaned vehicle following a customer repair
Customer perception of the repair is raised when they receive a cleaned vehicle

NOTE: This wash service is preformed on virtually every vehicle that comes into the shop. The Detail Service is more elaborate and has a customer charge, whereas this Wash Service in free. Students may routinely bring their vehicles in for this free service; they appreciate this because their vehicles consistently look their best.

Year: _____ **Make:** ________ **Model:** ________

WASH SERVICE



STEPS | **INITIALS** | **NOT REQUIRED**

1. __________ ☐ Hand clean inside front windshield
2. __________ ☐ Brush tire side walls
3. __________ ☐ Wet, sponge and rinse exterior
4. __________ ☐ Hand clean outside of all windows and mirrors
5. __________ ☐ Spray on tire conditioner

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.

Other worker comments:

____

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Wheel Alignment Service Form

USE: To ensure that the student completes the steps in order and initials who has completed each task. Clear instruction and demonstrations of the expected level of proficiency must have already been established. The students can then indicate on their daily work report what tasks of the service they have preformed to request a grade of their demonstrated work in the particular area.

BENEFIT: Quick and efficient way to set a standard of customer service
Future reference for students
Students can be efficiently directed to the form when they ask the teacher
Establishes a consistent set of answers to commonly asked questions
Aids the reader in making changes in the Wheel Alignment Service
This form has the student do most of the administrative duties rather than the teacher
This goes to the customer and helps them understand the level of service indicated
The customer reads the names of the student who have done the job
Customers usually thank students in their shop evaluation form
All those involved sense the high level of customer service and tell others

Year: ______ Make: __________ Model: __________.

WHEEL ALIGNMENT PAGE 1

Customer Driving Indicators:

____

____

____

____

STEPS	INITIALS	NOT REQUIRED	
1.	______	☐	Customer indicators
2.	______	☐	Alignment Pre-checks

Front shocks	☐ PASS	☐ FAIL
Rear shocks	☐ PASS	☐ FAIL

LF RF ☐ ROTATION NEEDED

__% __% WORN

LF RF ☐ BALANCE NEEDED

__% __% WORN

______ ☐ Tire Pressures

LF RF Set all four to:

__ lbs ____ lbs

LR RR

__ lbs ____ lbs

Notable tire/alignment conditions:

____

____

____

4. _____ ☐ Notable test drive/alignment conditions:

_____________________ Pulls L ☐

_____________________ Pulls R ☐

12 o'clock

_____________________ Spoke position ◯ clock posit

_____________________ Shimmy ☐

_____________________ Wanders ☐

_____ ☐ Steering Box: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Rack/Pinion: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Outer Tie Rod Ends: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Inner Tie Rod Ends: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Upper Ball Joints: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Lower Ball Joints: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Front Springs: ☐ Pass ☐ Fail ☐ N/A

_____ ☐ Rear Springs: ☐ Pass ☐ Fail ☐ N/A

---

5. _____ ☐ Alignment Specifications:

Year: _________ Make: _____________________ Model: _________________

Camber: _____________________

Caster: _____________________

Toe-In: _____________________

---

6. _____ ☐ Actual Camber/Caster

L Camber: _____ Caster: _____

R Camber: _____ Caster: _____

↑ Toe-In = __________

7. _____ ☐ Ideal Creative/Artistic Set-up

L Camber: _____
Caster: _____

R Camber: ____
Caster: ____

↑ Toe-In = __________

8. _____ ☐ Final Settings

L Camber: _____
Caster: _____

R Camber: ____
Caster: _____

↑ Toe-In = __________

9. _____ ☐ Final Road Test

☐ Pass

☐ Fail

Spoke position

WORKER	BLOCK	SIGNATURE

If more than three, use back of sheet.

Other worker comments:

____

____

____

____

____

Program Flow Chart

USE: To indicate to the reader the expected progression and sequence of the school's chosen courses. This clearly conveys the courses chosen based on teacher qualifications, school equipment issues, and the school's timetabling.

BENEFIT: Future reference for students
Students can be efficiently directed to the flowchart when they ask the teacher
Establishes a consistent set of answers to commonly asked questions
Aids the reader in making changes in the program
Aids the students in understanding where they are in the program
Aids the students in understanding what future courses can be taken

NOTE: The flow chart should be referenced with both the Alberta Learning and the apprenticeship to guarantee that all the prerequisites are understood for funding and the articulation requirements necessary for advanced standing.

YOUR SCHOOL AUTOMOTIVE PROGRAM FLOW CHART

INTRODUCTION 10
Grade 10

- Safety & Shop Practices — CTR 1210
- Vehicle Service & Care — MEC1020
- Engine Fundamentals — MEC1040
- Mechanical Systems — MEC1130
- Ride & Control System — MEC1150
- Pneumatics and Hydraulic — MEC1110

6 (Credits) Format

Prepared by: YOUR NAME

October 15, 1999or New Date

INTERMEDIATE 20
Grade 11

- Braking System — MEC2110
- Power Trains — MEC2130
- Manual Transmissions & Transaxles — MEC2140
- Suspension Systems — MEC2150
- Steering Systems — MEC2160
- Alternative Fuel Engines — MEC2050
- Lubrication & Cooling Systems — MEC2030
- Fuel & Exhaust Systems — MEC2040
- Ignition Systems — MEC2060
- Electrical Fundamentals — MEC1090
- Electrical Components — MEC2090
- Vehicle Detailing — MEC2010

ADVANCED 30
Grade 12

- Wheel Alignment — MEC3150
- Wheel Alignment Project — CTR3120
- Drive Train Repair — MEC3140
- Standard Transmission Project — CTR1120
- Rear Axle & Differential Project — CTR3140
- Buying & Selling — MEC3010
- Engine Performance Diagnosis — MEC3030
- Engine Tune-Up — MEC3040
- Engine Removal & Installation — MEC3050
- Engine Reconditioning I — MEC3060
- Engine Reconditioning II — MEC3070
- Alternative Energy System — MEC3080

ARTICULATION
Grade 11 and 12

- Safety Systems — MEC 3100
- Structures & Materials — MEC1160
- Hydraulic Accessories — MEC2120
- Brake Project — CTR2110
- Vehicle Maintenance — MEC2020
- Vehicle Value Appraising — MEC3020
- Engine Component Project — CTR3130
- Automatic Transmissions — MEC3130
- Emission Controls — MEC2070
- Power Assisted Accessories — MEC2100
- Computer Systems — MEC3090
- Future Vehicles — CTR2110

APPENDIX E

APPRENTICESHIP BOARD FLOW CHART

SCOPE AND SEQUENCE

INTRODUCTORY	INTERMEDIATE	ADVANCED	THEME
Modes & Mechanisms MEC1010	Vehicle Detailing MEC2010	Buying & Selling Vehicles MEC3010	Vehicle Design and Ownership
Vehicle Service & Care MEC1020	Vehicle Maintenance MEC2020	Vehicle Value Appraisal MEC3020	
	Lubrication & Cooling MEC2030	Engine Diagnosis◆ MEC3030	Propulsion Systems
Engine Fundamentals MEC1040	Fuel & Exhaust Systems MEC2040	Engine Tune-up MEC3040	
	Alternative Fuel Engines MEC2050	Engine Replacement◆ MEC3050	
	Ignition Systems MEC2060	Engine Reconditioning 1 MEC3060	
	Emission Controls MEC2070	Engine Reconditioning 2◆ MEC3070	
		Alternative Energy Systems◆ MEC3080	
Electrical Fundamentals MEC1090	Electrical Components MEC2090	Computer Systems◆ MEC3090	Guidance and Control Systems
	Power Assist Accessories MEC2100	Safety Systems MEC3100	
Pneumatics & Hydraulics MEC1110	Braking Systems MEC2110	Climate Control◆ MEC3110	
	Hydraulic Accessories MEC2120	Power Assisting MEC3120	
Mechanical Systems MEC1130	Drive Trains MEC2130	Automatic Transmissions◆ MEC3130	
	Transmissions/Transaxles MEC2140	Drive Train Repair MEC3140	
Ride & Control Systems MEC1150	Suspension Systems MEC2150	Wheel Alignment MEC3150	Suspension and Structural Systems
Structures & Materials MEC1160	Steering Systems MEC2160	Body Repair Estimation◆ MEC3160	
Metal Forming & Finishing MEC1170	Metal Repair & Finishing MEC2170	Damage Analysis MEC3170	
	Trim Replacement MEC2180	Damage Repair 1◆ MEC3180	
Surface Preparation 1 MEC1190	Surface Preparation 2 MEC2190	Damage Repair 2 MEC3190	
	Refinishing 1 MEC2200	Refinishing 2 MEC3200	
	Touch-up & Finishing MEC2210	Plastic & Fibreglass◆ MEC3210	
	Interior Repairs◆ MEC2220	Glass Replacement◆ MEC3220	
		Refinishing 3◆ MEC3230	

_____ Prerequisite - - - - Recommended sequence

◆Refer to specific modules for additional prerequisites.

APPENDIX F

ALBERTA LEARNING FLOW CHART

SCOPE AND SEQUENCE

INTRODUCTORY	INTERMEDIATE	ADVANCED	THEME
Modes & Mechanisms MEC1010	Vehicle Detailing MEC2010	Buying & Selling Vehicles MEC3010	Vehicle Design and Ownership
Vehicle Service & Care MEC1020	Vehicle Maintenance MEC2020	Vehicle Value Appraisal MEC3020	
	Lubrication & Cooling MEC2030	Engine Diagnosis◆ MEC3030	Propulsion Systems
Engine Fundamentals MEC1040	Fuel & Exhaust Systems MEC2040	Engine Tune-up MEC3040	
	Alternative Fuel Engines MEC2050	Engine Replacement◆ MEC3050	
	Ignition Systems MEC2060	Engine Reconditioning 1 MEC3060	
	Emission Controls MEC2070	Engine Reconditioning 2◆ MEC3070	
		Alternative Energy Systems◆ MEC3080	
Electrical Fundamentals MEC1090	Electrical Components MEC2090	Computer Systems◆ MEC3090	Guidance and Control Systems
	Power Assist Accessories MEC2100	Safety Systems MEC3100	
Pneumatics & Hydraulics MEC1110	Braking Systems MEC2110	Climate Control◆ MEC3110	
	Hydraulic Accessories MEC2120	Power Assisting MEC3120	
Mechanical Systems MEC1130	Drive Trains MEC2130	Automatic Transmissions◆ MEC3130	
	Transmissions/Transaxles MEC2140	Drive Train Repair MEC3140	
Ride & Control Systems MEC1150	Suspension Systems MEC2150	Wheel Alignment MEC3150	Suspension and Structural Systems
Structures & Materials MEC1160	Steering Systems MEC2160	Body Repair Estimation◆ MEC3160	
Metal Forming & Finishing MEC1170	Metal Repair & Finishing MEC2170	Damage Analysis MEC3170	
	Trim Replacement MEC2180	Damage Repair 1◆ MEC3180	
Surface Preparation 1 MEC1190	Surface Preparation 2 MEC2190	Damage Repair 2 MEC3190	
	Refinishing 1 MEC2200	Refinishing 2 MEC3200	
	Touch-up & Finishing MEC2210	Plastic & Fibreglass◆ MEC3210	
	Interior Repairs◆ MEC2220	Glass Replacement◆ MEC3220	
		Refinishing 3◆ MEC3230	

——— Prerequisite - - - - Recommended sequence

◆Refer to specific modules for additional prerequisites.

APPENDIX G

ALBERTA HIGH SCHOOL GRADUATION REQUIREMENTS

Alberta High School Graduation Requirements

USE:	To indicate to the reader the expected requirements for graduation
BENEFIT:	Future reference for students
	Students can be efficiently directed to the requirements when they ask the teacher
	Establishes a consistent set of answers to commonly asked questions
	Aids the reader in making changes in the program
	Aids the students in understanding where they are in their program
	Aids the student in understanding what future courses can be taken and must be taken

ALBERTA HIGH SCHOOL

DIPLOMA INFORMATION

To receive an Alberta High School Diploma, a student must:

1. Earn a minimum of 100 credits
2. Earn credits in the following courses:
   - 15 credits in English including English 30 and 33
   - 15 credits in Social Studies including 30 and 33
   - 10 credits in Mathematics
   - 10 credits in Science
   - 3 credits in Physical Education 10
   - 3 credits in Career and Life Management 20
3. 10 credits in any combination, from:
   - Career and Technology Studies (CTS)
   - Fine Arts or Second Languages
4. 10 credits in any 30 level (Advanced level) courses in addition to English 30 and 33 and Social 30 and 33.

NOTE: Provincial Exams – Completion is required for English 30 or 33 and Social Studies 30 and 33. For those going to 30 level Mathematics and Science courses, completion of a diploma examination is also required. The final mark is a combination of your school (50%) and your exam mark (50%).